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ABSTRACT

This manual, which is based on extensive research on cognitive psychology and organizational theory, contains resources for nine workshop sessions designed to help people become creative problem solvers in their workplace and their lives. The materials are based on Bransford and Stein's IDEAL model, according to which successful problem solving entails the following actions: Identify problems that others may have overlooked; Develop at least two sets of contrasting goals for any problem and define them explicitly; Explore strategies and continually evaluate those strategies' relevance to their goals; Anticipate the effects of strategies before acting on them; and examine the effects of their efforts and Learn from them. Topics addressed in the nine modules are as follows: the importance of problem solving; the IDEAL framework; understanding ourselves; enhancing creativity; perfecting the art of learning (this topic is covered in two sessions); assessing what we know; effective communication; and putting it all together. After a note to trainers that explains the principles of the IDEAL model and the trainer's role in helping master problem-solving strategies, the following materials are provided: module overviews and lesson plans; exercises for grammar, vocabulary, writing, and math; student handouts; pretests and posttests, and answer keys to all exercises and tests. (MN)

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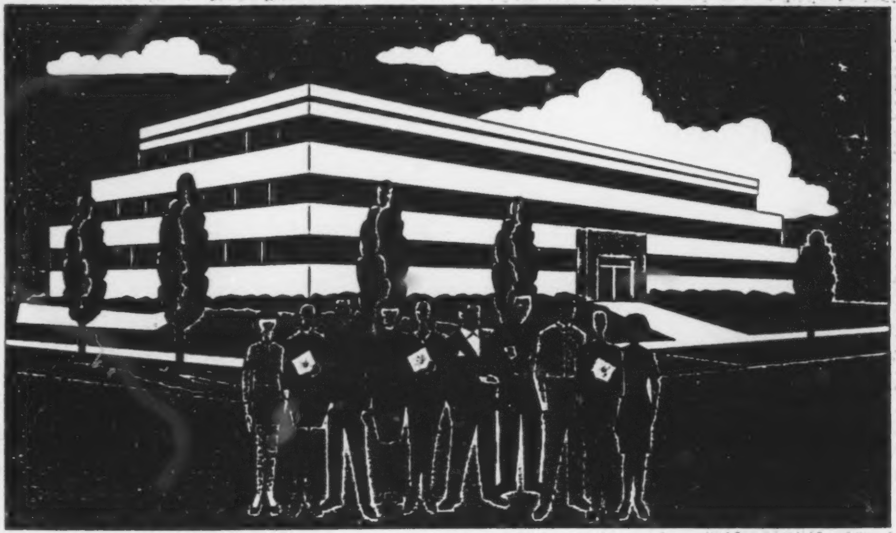
The IDEAL Workplace:

Strategies for Improving Learning, Problem Solving, and Creativity



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The IDEAL Workplace:
Notes for the Trainer

National studies of the workplace emphasize the benefits of helping people increase their abilities to learn, solve problems and think creatively. This manual provides a set of resources that can help people take a creative, problem solving approach to their workplace and their lives The suggestions in this manual are based on extensive research in the areas of cognitive psychology and organizational theory. The exercises are designed to help people improve their abilities to:

- identify and solve important problems
- learn new information
- acquire new skills
- increase creativity
- communicate effectively
- work together as a team

IDEAL problem Solving

The materials in this manual are organized around methods outlined in ***The IDEAL Problem Solver*** (Bransford & Stein, 1994). The IDEAL model helps people understand that successful problem solvers actively attempt to (a) identify problems that others may have overlooked; (b) develop at least two sets of contrasting goals for any problem and define them explicitly; (c) explore strategies and continually evaluate their relevance to their goals; (d) anticipate the effects of strategies before acting on them; and (e) look at the effects of their efforts and learn from them.

The IDEAL model becomes more meaningful when it is contrasted with more typical, everyday problem solving--what we call routine problem solving. We first discuss routine problem solving , then we contrast it with IDEAL.

ROUTINE PROBLEM SOLVING.

Routine problem solving is the kind of problem solving that most of us do quite naturally. If our car doesn't start we may try a few strategies such as "check the water in the battery" or "get out the jumper cables". If our living room lamp doesn't go on we may use problem solving strategies such as "check the plug" or "check to see if the bulb is burned out". If we read something that doesn't make sense we may use a strategy of stopping, backing up and reading it again. In general, routine problem solving is relatively fast and effective; usually we have encountered similar problems before and have a pretty good idea of how to solve them. Therefore, we try something and see if it works; if it doesn't, we try something else. If we are lucky, we'll eventually solve the problem through a process of "trial and error".

Sometimes, however, routine problem solving fails us--either because our strategies don't work, or because we end up using a strategy that is much less effective than we would have come up with if we had approached the problem more creatively .

An Illustration of Routine Problem Solving: As an illustration of relatively routine problem solving, consider a business where managers were trying to keep people from interrupting personnel interviews. A sign on the door said "Interview in progress. Please do no enter". Nevertheless, people often opened the door anyway.

The managers felt that it was relatively easy to understand the problem . The visitors were not noticing the sign on the door that said "Interview in progress. Please do not enter". Therefore, the managers devised a strategy of making the sign bigger. However, people still opened the door. The managers assumed that the sign still was not big enough so they made it even bigger. But visitors still persisted in opening the door and, as a result, interfered with the interviews. This is a case where relatively routine problem solving did not work.

THE IDEAL MODEL OF PROBLEM SOLVING

We noted earlier that routine, trial-and-error problem solving works in many instances. Nevertheless, it does not work in all instances. In particular , strategies of routine problem solving often get in the way of truly creative thinking. The IDEAL Framework provides a perspective on problem solving that expands our normal repertoire of problem solving strategies. The goal of IDEAL is to increase creativity and learning. Components of the IDEAL Framework are discussed below.

- ***INTENTIONALLY* attempt to *IDENTIFY* Problems and treat them as opportunities.**

The first step in the IDEAL model is to intentionally attempt to identify problems and treat them as opportunities. This is different from simply reacting to problems once they occur.

One reason for intentionally looking for problems and treating them as opportunities is that people often fail to recognize that various events are not "necessary facts of life". Instead, these events may represent potentially solvable problems that provide opportunities for inventive thinking. When people intentionally look for problems and view them as opportunities for change, it gives them a chance to improve their lives.

Many people in the 1800's treated severe traffic congestion as a "necessary fact of life". One who didn't was William Enno. He realized that traffic congestion was a potentially solvable problem, and he invented devices such as stop signs, one-way signs, and eventually traffic lights.

Called "The father of traffic safety", Enno identified a set of problems that represented opportunities for creative thought.

There are numerous additional examples of how creativity is closely linked to active attempts to intentionally identify problems and treat them as opportunities. Consider inventions such as the paper clip, staples, post-it-notes, a ball-point pen or the Xerox machine. Each of these ideas began with someone noticing a problem that others either ignored or thought was unsolvable. People who are known for "taking initiative" are usually good at identifying problems and treating them as opportunities for success.

Effective problem solving also includes attempts to identify personal problems that may be impeding our success in working efficiently and in acquiring new knowledge and skills. For example, some of us are less organized than we should be, some of us have difficulty reading or doing mathematics or working with others. Once these areas are identified, they become opportunities to improve.

It is important to differentiate (1) attempts to identify problems that represent opportunities for progress from (2) complaint sessions . Complaint sessions usually waste a lot of time and energy--they generate more heat than light. For example, millions of people in the world believe that they are not paid enough for their job. This may well be true, but simply complaining, or asking for more pay, does not help your boss see new opportunities for progress. A much more productive strategy is to attempt to identify situations where there are problems of waste and inefficiency that, if solved, could same the company money. Once you come up with strategies for saving money, you are in a much better position to ask for a raise.

• *DEVELOP an Understanding of Problems and DEFINE Your Goals*

The second component of IDEAL involves developing an understanding of the problem you have identified and explicitly attempting to define **alternative** goals. This is very different from routine problem solving where the attempt is usually to quickly think of one possible cause for a problem and move to the stage of generating a strategy for solving it. The process of routine problem solving frequently limits creativity.

Consider the example discussed earlier where managers were trying to keep people from interrupting personnel interviews by increasing the size of a sign on the door saying "Interview in progress. Please do no enter". The managers kept believing that the problem involved the sign being too small.

What the managers had failed to do is attempt to develop a deeper understanding of the problem, and use this understanding to explicitly **define** at least two goals for problem solving. The managers had implicitly defined their goal as "make sure that people can't miss seeing the sign." Failures to develop deep understandings of problems and attempt to **define** alternate goals is very characteristic of routine problem solving.

It finally occurred to the managers that they needed a better understanding of what people were thinking when they ignored the "do not enter" SIGN. So they interviewed some of the people and asked them why they had opened the door.

The interviews helped the managers understand the problem from a very different perspective. Everyone indicated that they saw the sign and could read it. However, they were used to seeing lots of signs that had been left up by someone but were no longer in effect. (How often have you seen "road construction" signs but then find no road construction?) The people interviewed said they first tried to listen through the door and couldn't hear anything coming from the room. Therefore they opened the door, and consequently disrupted the interview.

Once the managers understood the problem from this new perspective they modified their goals. Instead of the single goal "make sure that people can see the sign", an alternate goal became " make sure that people can see the sign and know that it is currently in effect." This led to a strategy that is discussed below.

- ***EXPLORE* Possible Strategies and *EVALUATE* How They Fit Your Goals**

The third component of the **IDEAL Framework** focuses on the importance of exploring a variety of strategies for achieving our goals. In the above situation the strategy that was finally chosen was simple: the managers put a peephole in the door so people could see if anything was going on in the room. Once they did this, people stopped opening the door.

Note however that this now opened up ideas for strategies that would probably not have been considered otherwise.

- ***ANTICIPATE and then ACT***

The **IDEAL Framework** also emphasizes the importance of attempting to anticipate the potential effects of your strategies before you act on them. Often people fail to effectively anticipate a strategy's possible effects. Lack of careful attention to "anticipate" is very characteristic of routine problem solving.

Consider a problem solving strategy used by a radio station in a large city. They decided to help solve problems of violence by paying students $100 for every handgun they turned in to the station. After acting on their plan, the station managers were criticized because they had failed to carefully anticipate the possible implications of their actions. Police argued that the strategy could easily backfire because many people could use the $100 gained by turning in one (probably cheap, possibly stolen) gun to purchase 4 new handguns at $25.00 each.

At some point we need to stop **anticipating** and decide to **act.** Some people never actually act on their strategies because they fear failure. Effective problem solvers have the **courage to act** on their ideas.

- ***LOOK Back and LEARN***

The final component of IDEAL is Look back and Learn. Successful problem solvers always look back at the effects of their attempts to solve problems, and they try to **learn from their mistakes**.

We noted earlier that routine problem solving involves a phase of looking at the effects of one's attempts to solve problems. If strategies have not worked (e.g., if people still keep opening the door and interrupting interviews), people often try again.

However, **there are important differences between looking at the effects of one's strategies and attempting to truly learn from the experience.** The IDEAL model includes an emphasis on learning because it is extremely important for subsequent problem solving. **Good problem solvers learn from their experiences** irrespective of whether their solution attempts were positive or negative. If they have successfully solved a problem they ask themselves whether they might have done so in a more efficient manner, and how they can improve on this the next time. If they have not been successful, they try to understand why so that they can improve their problem solving the next time around.

OVERVIEW OF THE WORKSHOP

This manual provides materials for eight recommended workshop sessions that are designed to help people increase their confidence and competence in problem solving. All are organized around the IDEAL framework. The sessions are designed for flexibility. As the trainer, you will know best how to order the sessions and tailor them to your particular needs.

Figure 1 here

Figure 1 illustrates how the IDEAL framework provides the foundation for each of the workshop sessions. The more that IDEAL is applied to particular areas, the more intuitive it becomes. By the end of the course, participants should have a good understanding of how to apply IDEAL to their own work situation.

Participants will learn that they usually need to cycle through IDEAL a number of times before solving any particular problem, and they will learn that they should not always proceed through IDEAL in a step-by-step manner. For example, later stages in IDEAL (e g., exploring strategies) may prompt them to return to earlier stages (e.g., defining goals) and view them in new ways.

As the Trainer, you can gain familiarity with IDEAL by applying it to some of the problems mentioned in this introduction. For example:

1. The interrupted interview problem that a business tried to solve.
2. The guns and violence problem that the radio station attempted to solve.
3. The "are we there yet?" problem with children on trips (this problem is discussed later in this chapter).

We include a **Problem Navigation Guide** in the ***Resources*** manual. You might want to copy it and use it to become familiar with the IDEAL Framework. In *Resources* we also provide some of our thoughts about ways that IDEAL relates to problems such as the one discussed above. Our thoughts are not necessarily "the right answer". You need to judge answers relative to your situation, knowledge and needs.

INSTRUCTIONAL METHODS

This course is not designed to be a lecture course. Instead, it presents a unique set of experiences that are designed to help participants understand and practice basic skills needed to learn effectively, solve problems, and work effectively in groups. Research clearly demonstrates that people learn most effectively by doing rather than by listening to others talk.

We assume that you will be the trainer who organizes and leads the IDEAL workshops. As a trainer, you will be responsible for explaining the exercises to the participants, answering questions about procedures, and summarizing the purposes of the exercises when they are completed. Other important functions include helping motivate people to succeed, encouraging people to stay on track, and occasionally helping groups that get stuck by suggesting some alternatives.

One of the clearest lessons from research on human learning is that **people have different learning needs depending on their current levels of skill and knowledge**. If someone cannot read well, you need to provide levels of support that are unnecessary for those who read fluently. If English is not a person's native language, you may need to help them understand the vocabulary that you use. Similarly, some people may spell eloquently but have difficulty expressing themselves in writing: some have difficulties talking in a group or making presentations to others because of nervousness, and so forth. The most important principle of learning is to **begin with what people know and help them build on that knowledge.**

Your ability to help participants will be proportional to your ability to appreciate their unique strengths and weaknesses, and to help them realize that the ability to identify weaknesses (problems) and work to improve them is a tremendous strength. You may find it necessary to adapt or modify the exercises developed for this program to suit the needs of individuals with special needs. if you do find it necessary to adapt the exercises, try to keep in mind what we are trying to accomplish in each task .

FURTHER EXPLORATIONS OF YOUR ROLE AND OURS

A number of people have found it useful to further explore the relationship between their role as Trainers and our role as the authors of this book. This relationship can be clarified by considering an analogy to a recent newspaper article that discussed ways to help make car travel easier for parents who were going on trips with their children (Trust us, this analogy will be relevant).

Every parent who travels with children is familiar with the oft-repeated question: "Are we there yet?" How might parents solve the problem of keeping children engaged so that this question is not repeatedly asked?

The idea from the newspaper was to have a grab bag for each of the children -- a grab bag filled with a variety of interesting items. At designated times (perhaps every 30 minutes), the parent should allow the child to reach into the grab bag and, without looking, pull out some item. Ideally, the item will be engaging to the child for the next 30 minutes. It might be a coloring book, a drawing tablet, a book, a puppet or something similar. After another 30 minutes, the child is allowed to pull another item from the bag.

The beauty of the idea is that it provides a sense of mystery (the child never sees everything in the grab bag) that is resolved on a reasonable time schedule. Thus if a child asks "Are we there yet?", the parent can say "No, but we're only 10 minutes away from the next grab bag time."

Note that the newspaper article on creating a grab bag did not include specifics for the exact items to put in the bag. Obviously, the grab bag idea works only if the items in the bag are interesting to the children. How can we be certain that the items in the bag are appropriate for the child involved?

No one is going to have a better idea of a child's interests than the child's parents. Different things interest girls and boys, 3 year olds and 6 year olds, and so forth. Even within a category (e.g ., 6 year old girls), there are tremendous variations among children. if the newspaper article had tried to specify contents for the bag that appeal to everyone, it would have diminished the benefits of the recommendation. A "one size fits all" grab bag would be far less exciting to children than grab bags designed by parents who know their children best.

The newspaper article on creating a grab bag for children is analogous to this manual. The article contained valuable information about a general strategy (the grab bag) plus some suggestions for the kinds of things to put in it. Similarly, this manual contains ideas for exercises involving learning and problem solving that the research literature shows are effective. However, just as the contents of the grab bag needed to be chosen by each child's parents, **the specific examples to be used in any particular workshop need to be chosen by someone who is knowledgeable about each participant's needs and interests. In the case of the IDEAL Workplace, that person is you.**

It is worth noting that many curricula for schools and business training are dramatically different from the "interactive model" illustrated by the grab bag example. These curricula try to supply everything to the trainer: the exact content to be taught, the exact sequence of instruction, with little or no flexibility. As the educator Gerry Duffy puts it, there is a tradition in education of accepting "prescriptions from absentee curriculum developers". This approach to curriculum ignores the most important ingredient in the learning equation--the strengths and needs of the individual people involved .

The IDEAL Workplace is based on an "interactive" model of curriculum design -- one that is being endorsed by more and more educators. According to this model, curriculum developers supply general principles analogous to the general idea of using grab bags, plus various examples of possible content. But many choices are left to the trainers. **As the Learning Specialist who organizes workshops, you know the people in your workshop and their individual strengths, weaknesses and interests; you know the specific objectives of your company; you know what resources are available that can be added to the curricula.**

No one wants to end up with a mediocre program analogous to a grab bag designed by a central committee. This means that **your role as a learning specialist is absolutely central for making things work**. To help you accomplish this goal we have included several options in each lesson. We have also tried to explain the goals of each lesson so that you can design or modify these materials to suit your needs.

The curriculum for this workshop can also be tailored to the participant's needs and interests in another way. Throughout the workshop the participants will learn how to apply the IDEAL framework to a problem they have identified in addition to the problems presented in this manual. The workshop experience will culminate in a presentation of their plan for solving their own important real-world problem (see Figure 2).

Figure 2

Session 1: Overview: The Importance of Problem Solving
Session 2: Introduction to the IDEAL Framework
Session 3: Understanding Ourselves
Session 4: Enhancing Creativity
Session 5: Perfecting the Art of Learning I
Session 6: Perfecting the Art of Learning II
Session 7: Assessing What We Know
Session 8: Effective Communication
Session 9: Putting It All Together

Encouraging Participants to Leave a Legacy

An excellent way to build motivation is to encourage participants to "leave a legacy" that can help others who follow in their footsteps. Ask them to keep track of reactions, examples of interesting problems and solutions, and so forth. These can then be added to the resources for this workshop and shared with others who take the course later on.

As the trainer, you can invite conference participants to publish their own insights and problems as additions to your resources. By helping them edit their publications, you can help them learn to develop their communication skills. The chance to publish materials that can be used by others in their company is motivating as well.

It is possible, down the line, that The IDEAL Workplace may establish a World Wide Web site where ideas and insights can be shared throughout the world. For the moment, however, it is sufficient to ask participants to create something that they feel will help others in their company who want to increase their abilities to solve problems and learn.

The materials can be published in a variety of formats. The simplest is text. However, audiotapes and videotapes can also be created. In some settings, so can multi-media presentations.

The idea of leaving a legacy can become the final project for this workshop. It is something that can be thought about during each session so that ideas evolve systematically. In addition to being motivating, the goal of leaving a legacy is excellent for team building as well as for individual learning. Learning is enhanced when individuals continually ask themselves what they are finding valuable and what they want to contribute to the overall discussion. A sense of team is enhanced when people work together to accomplish a common goal.

At the end of each session we recommend using a **summary and feedback sheet** that attempts to capture individuals' thoughts about each session. Examples are in *Resources.* These sheets can help prepare the way for creating an interesting legacy (or legacies) to be left by the group.

Figure 1

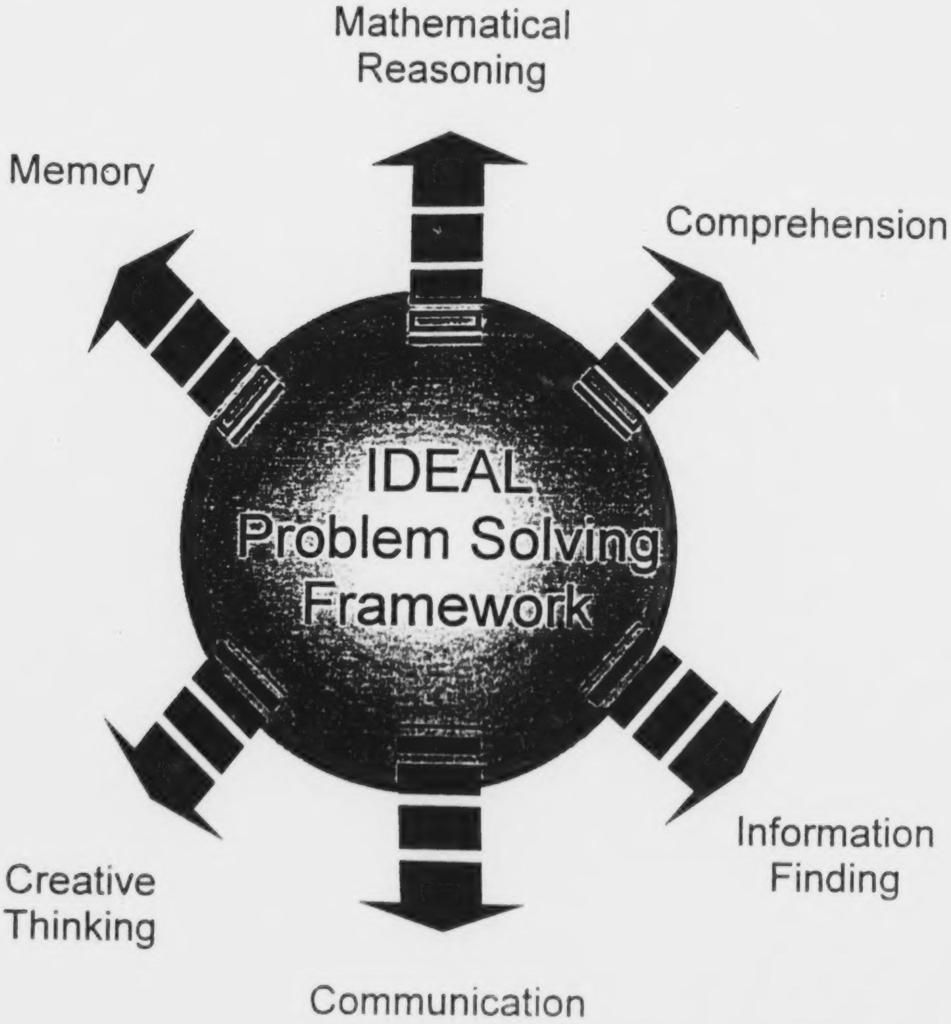
Mathematical Reasoning
Memory
Comprehension
IDEAL Problem Solving Framework
Information Finding
Creative Thinking
Communication

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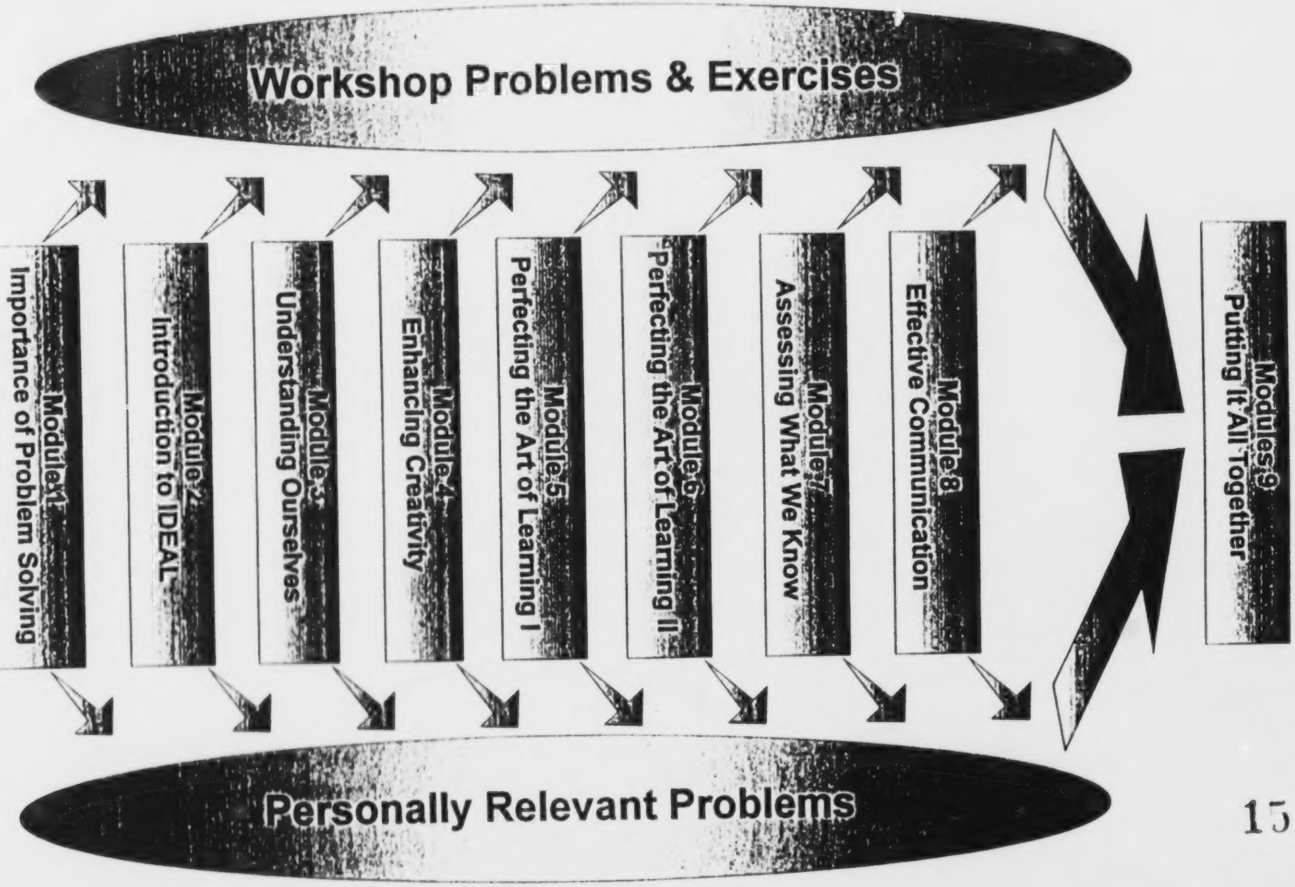
Figure 2


Workshop Problems & Exercises
Module 1
Importance of Problem Solving
Module 2
Introduction to IDEAL
Module 3
Understanding Ourselves
Module 4
Enhancing Creativity
Module 5
Perfecting the Art of Learning I
Module 6
Perfecting the Art of Learning II
Module 7
Assessing What We Know
Module 8
Effective Communication
Modules 9
Putting It All Together
Personally Relevant Problems

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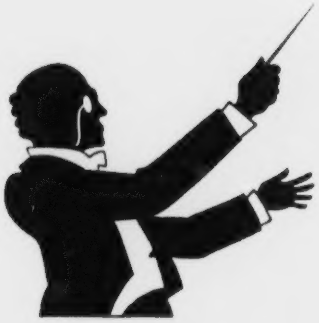
Module 1

THE IMPORTANCE OF PROBLEM SOLVING



The goal of this module is to introduce people to the workshop and help them see the value of improving their problem solving skills. Everyone knows how to solve problems to some extent, but research shows that most people have considerable room for improvement. The workshop is called the IDEAL Workplace because we will use the IDEAL problem solving framework to help us become better problem solvers.

As the workshop proceeds, everyone will be encouraged to identify problems that are personally relevant. They will also be encouraged to identify some skill(s) that they would like to improve (communication, reading comprehension, learning, getting along with others). Everyone will be encouraged to help one another solve these problems while they are exploring the IDEAL framework.

One of the most important features of this first module is to let people experience the power of "mental strategies" that can help them solve problems. Nothing motivates people like the experience of success.

Goals

- Explain Purpose of the Workshop
- Promote group cooperation
- Improve a memory skill
- Learn to break a problem into parts
- Improve confidence
- Introduce problem solving
- Improve a verbal reasoning skill
- Use external representations

Exercise & Resource Options for Module 1

Resource#	Name	Purpose
A 1	Simple Icebreaker	People introduce their peers
A2	Introductory Exercise Solve the Mystery	Icebreaker, generate discussion about problem solving
A 3	Verbal Reasoning	Improve a verbal reasoning skill
A 4	Memory Exercise	Dramatically improve memory
A 5	Comprehension Exercise	Decipher Bacon's quote
A 6	Metacognition	Explain the concept
A 7	Leave a legacy	Suggestion for workshop
A 8	Assessment	Evaluate progress

Module I: The Importance of Problem Solving

1. Explain the goal of The IDEAL Workplace.

The goal of the IDEAL Workplace is to help each of us take a problem solving approach to our work and our lives. The workshop is called the IDEAL Workplace because we will use the IDEAL problem solving framework to organize our activities. We'll discuss IDEAL later on.

The point of introducing the IDEAL framework is not to suggest that people can't solve problems without it. All of us know how to solve problems. If we didn't we wouldn't be alive. However, typical approaches to problem solving are often limited in their effectiveness. We are used to encountering relatively routine problems that can be solved by a process of trial-and-error. The trial-and -error approach to problem solving often works. But it also often limits us because it locks us into old patterns of thinking that go unmodified. The IDEAL approach helps people think more creatively about problems. So we will learn to move from a trial-and-error approach to the IDEAL approach.

By the end of this workshop you will have become familiar with the IDEAL approach and learned to apply it to a variety of problems such as how to learn more effectively, how to think more creatively, how to better work with others, and how to communicate.

2. Help Participants Get Acquainted (If Needed)

This might be a good time to get the participants acquainted with one another if they need to--or at least for you to meet them.

The "Get Acquainted" section of *Resources* provides suggestions for relevant activities. One is very short and requires little time. The other is longer but lots of fun.

3. Experiencing the Power of Useful Strategies

Explain to participants that you will begin to explicitly explore the IDEAL problem solving framework during the next session. First, it is useful to let them experience the power that various strategies can have on their abilities to learn, understand, and think creatively.

• **A Comprehension Problem:** You can begin by giving participants the following comprehension problem to solve. Read it and ask people if they understand it (they won't). What do they need to solve it? Someone will want to see it written out--let everyone see it in writing and try to figure it out.

The unassisted hand and the understanding left to itself possess but little power. Effects are produced by means of instruments and helps, which the understanding requires no less than the hand.

Sir Francis Bacon, 1620

Bacon's statement is worded strangely by today's standards--it represents a good example of a "comprehension problem". Ask participants for their interpretations. Since this wording is strange, no one needs to feel badly if they don't interpret it properly.

A good strategy to suggest is "break the problem into parts". One way to do this is to proceed sentence-by-sentence. A different use of this strategy is to first focus on the concept of "the unassisted hand" and understand what Bacon has to say about that. Then focus on what he says about "the understanding" and its realtionship to "the unassisted hand".

Our interpretation of Bacon's basic point is as follows: Just as we need physical tools to perform most physical feats, we also need "mental tools" (e.g., mental strategies) to perform most mental feats.

The reason we need "mental tools" is that human's working memory capacity is limited---we can only attend to a limited amount of information at once . For example, it was difficult to simply listen to Bacon's quotation and hold everything in working memory so that you could analyze it. You needed to see the information written down so that you could return to it.

The good news about human's limited capacity for attention is that this allows us to focus our attention on details. The bad news is that we need additional inventions to help us think more effectively. A high level invention is the invention of written language. This allows us to do a number of things that we couldn't do without it. Without written language, it is very difficult for societies to solve the kinds of mathematical, scientific and comprehension problems that our society solves today

. But of course, there are many ways to write things down that may or may not be helpful. So we need more specific "externalization" or "representational" strategies . Let's explore some in a little more detail.

• **Verbal Reasoning Problems and Representation:** *Resources* includes a set of verbal reasoning problems that can be used to build on the previous discussion. For example, imagine that four people from an important organization are going to visit your company. You have a picture of the four of them standing side-by-side, but you want to know who is who. A quick telephone call from a busy friend tells you the following:

The president is shorter than the vice president but taller than the treasurer. The treasurer is shorter than the president but taller than the chief engineer.

Can you order the people from tallest to shortest? It's a very difficult task.

[At this point you can give people pretests on the verbal reasoning problems in Resources and then teach them the representational strategy and provide postests. Emphasize that this is just one example of the power of representing information in a way that helps us solve problems that otherwise would be extremely difficult to solve.]

- **Solving Memory Problems:** Sometimes we need to carry information in our heads rather than on paper. *Resources* includes some memory problems that can be used to illustrate strategies ("mental helps in Bacon's terms) that work. For example, you can ask people to assume that they are going to meet 10 visitors at a picnic and need to be able to remember something about each one so that they can bring up the topic in a discussion. Ask people to simply listen to the following list and see how well they can remember what is said:

The driver of the convertible sells horses.
The pilot of the airplane sells chickens.
The driver of the pickup truck sells jewelry
The one on the bicycle sells carrots.
The one on roller skates sells computers.
The person in cowboy boots sells pianos.
The one with the cape sells wine.
The one with the backpack sells books.
The one with red sunglasses sells boats.
The driver of the motorcycle sells stuffed animals.

After reading the list, ask participants to write down their answers. Randomize the order of the preceding statements and present participants with the first part of each one (e.g. "The person in cowboy boots".) Ask them to recall the appropriate information for each person. If participants simply listened to your statements (rather than used memory strategies such as imagery), their memory should be relatively poor.

Resources includes information about memory exercises that include pretests, strategy training, and posttests.

4. A Note about "Metacognition" and the Identification of Potential Problems

You might want to point out to people that there was a very important aspect of their problem solving that they probably took for granted. Ask participants to think about their reactions when you read them (i) the Bacon quote ,(ii) the statement about the relative heights of the president, vice president and other members of the company, and (iii) the list of people (e.g. the person with the cowboy boots) and what they sell (e.g., pianos). All participants probably realized that they couldn't solve these problem simply by listening to the information once. In short,they identified that a problem existed and realized the need to do something such as write things down or use memory strategies. If problems are not identified, people take no steps to solve them and fail later on.

Studies with young children (e.g. kindergarten and first graders) show that they often don't identify the existence of memory and comprehension problems. For example, Vanderbilt researchers gave first graders a set of secret knocks that were used by each of 10 different characters. Each character had a different secret knock. Students heard the knocks for each character and were then asked if they were ready to solve the problem of deciding who was at the door when they heard particular knocks. Nearly all of them were very excited by the task and very confident that they were ready for the test after hearing all 10 knocks only once. In short, they failed to identify the existence of a problem with their own memories.

After trying the task of listening to each knock and saying whose it was, the children realized that they needed more practice. Eventually, they learned to write down the knocks and represent them on paper. This allowed them to perform the task perfectly. Initially, however, they did not realize that a memory problem existed that they needed to solve.

The important point is that the ability to identify potential problems with our abilities to comprehend and remember is crucial for problem solving. This ability is often called "metacognition" (e.g., cognition about the state of our own cognitive processes). Even college students often fail to engage in appropriate kinds of "metacognitive" activities and hence arrive unprepared for tests. We will explore issues of metacognition as we proceed.

5. Summary and Next Time

In this introductory session you received a very small taste of some problem solving strategies ("mental helps" in Bacon's terms) and saw their effects on your performance. We will continue to introduce new strategies throughout this workshop. However, we will also go beyond a mere introduction of already-invented strategies and teach you to find and define problems that relevant to you, and invent strategies for yourself.

In the next session we will begin the process of helping you learn to find problems and invent strategies by exploring the IDEAL framework for problem solving .IDEAL provides a way to systematically approach problem solving . Taking a systematic approach is important because we must learn to identify and solve our own problems.

If you choose to do so, this is a good time to introduce participants to the idea of **"leaving a legacy"** that is discussed in *Notes to the Trainer.* Alternatively, you might want to introduce this idea as indicated by *** below.

Possible Homework: For homework, you might ask participants to find one problem from any aspect of life that they think is interesting enough to share with the group. Make sure you ask them to begin with a "small" problem, not a huge one (e.g. not: "my problem is that I don't know what to do with my life").

An example of a small problem might be "Getting a ring off your finger if it is stuck", or "Getting dents out of the rug that are made by furniture". Or it might be a problem such as "Scheduling one's time more efficiently" (although this is probably too big a problem to begin with). They are free to choose.

Ask participants to try to find a problem that is interesting and that people will probably not be able to solve at first glance. Ideally, they'll be able to suggest a strategy for solving the problem that will be helpful for people to know. If they don't know how to solve the problem that is fine too. You can get the "group mind" working on it.

Re-emphasize that the problem can be from any aspect of life. Try to find one that's fun. Later the workshop will begin to focus on solving problems that are directly related to participants' careers and work.

******* If you choose to do so, this is an alternate time to introduce participants to the idea of **"leaving a legacy"** that is discussed in *Notes to the Trainer.*

5. Obtaining Feedback

It is a good idea to spend the last part of each session getting written feedback from participants.*Resources* includes a possible questionnaire for the first session. You may want to modify it depending on your particular needs and goals.

Simple Icebreaker Exercise

Purpose: Help "break the ice" and get people to know one another without taking too much time.

Method: Pair people who do not know one another. Each person is responsible for interviewing the other and, later, for introducing the other to the group.

Ask people to focus on topics such as:

1. Job in company and years with the company
2. Family background (children, spouse)
3. Interesting hobby.
4. Why the person is attending the workshop.
5. What the person hopes to get out of the workshop.

INTRODUCTORY EXERCISE

SOLVE THE MYSTERY

VERSION 1: TAX AUDIT

How

You should first cut out each of the clues and distribute them to the group. Depending on the size of the group, you may need to give some individuals more than one clue. If you are working with a group larger than 22 you may want to make extra copies of some of the clues. **HOWEVER, YOU MUST DISTRIBUTE ALL OF THE CLUES, REGARDLESS OF THE GROUP SIZE.**

Announce to the group:

"Please solve the problem. You may do whatever is necessary to solve the problem except show someone your piece(s) of information."

The group may ask questions such as may we read our information or may we write them on the board. Just repeat. "You may do whatever is necessary to solve the problem except show someone your information."

At first you should expect puzzled expressions, people trying to solve a problem based solely on their clue, mass confusion, etc. This is normal. It usually takes groups a while to realize that the clues are connected and then it takes additional time for them to realize that they need to find an effective way to share their information. Hopefully, they will discover at some point that they need to use some form of external representation such as a blackboard to effectively solve their problem.

You should give them adequate time to solve the problem. When you think that either as a group or the majority of the individuals have solved the problem, you should ask them to agree on a suspect.

Then you should discuss the correct answer.

Answer:

John Banks erased the computer records.

Ask the group the following questions.

- How did they reach a decision?
- What was the motive?
- Did he have the opportunity?
- How did they rule out other suspects?
- What other clues pointed to John Banks?
- Were there clues that were either irrelevant or misleading, as there usually are in murder cases?

Then you want to discuss the process that just took place.

- Try to point out the weaknesses in their approach that may have made their efforts less effective.

- Try to get the participants to figure out how they could have been more effective problem solvers

Sample discussion questions

What happened initially?
Did they correctly identify the problem? Did they waste a lot of time before they identified the problem?
How did they define their goal? Did they realize they needed some type of external representation to keep track of all the information? If so, was it effective? If not, do they think that it would have made solving the problem easier?

This could lead into the exercise on external representation.

INTRODUCTORY EXERCISE

CLUES FOR SOLVE THE MYSTERY

VERSION 1

- The Problem: Who erased the computer records for 1994?
- Special computer skills and a password are needed to access company records.
- American Darnelle Company is being audited for the year 1994.
- Rick Brittle is a janitor at American Darnelle Company.
- White Organization feels that for whites to regain their strength, African American businesses must fail.
- No other copies of the financial records exist.
- John Banks is a racist.
- Darnelle Meeks owns American Darnelle Company.
- The crime happened at night.
- Mrs. Jackie Meeks was traveling through Europe on the night of the crime.
- The Head of the Information Systems Department changed the company password a week ago.
- Darnelle Meeks is African American.

- Jack Brittle is upset about losing his job at American Darnelle Company.
- The computer records of the American Darnelle Company are missing.
- Jackie Meeks hated Darnelle Meeks.
- If Janet Price wins her law suit she could receive a large amount of money from the American Darnelle Company.
- A formatted computer disk was found at the scene of the crime with the initials J.B.
- Jack Brittle lost his job at the American Darnell Company during the last company down sizing six months ago.
- System's Information Personnel are highly trained in the use of computers.
- Jackie Meeks is divorcing her husband and hopes for a large settlement.
- Janet Price is Mr. Meek's secretary.
- If Darnelle Company does not have a successful audit, it could be forced into bankruptcy.
- Jack Brittle is an accountant.

- John Banks belongs to a White Supremist Organization called White.
- Rick Brittle is the father of Jack Brittle.
- Janet Price has filed a sexual harassment law suit against Mr. Meeks and the American Darnelle Company.
- John Banks is the head of the company's Information Systems Department.
- Jack Brittle has not been able to find a new job.
- All company financial records are kept on a computer.
- Jack Brittle was one of the first employees to lose his job because he did not have any computer skills.

INTRODUCTORY EXERCISE

SOLVE THE MYSTERY*

Version 2: Murder

Why

The purpose of this exercise is to enhance group cooperation, communication skills, and problem solving skills. The participants are each given a clue in a murder mystery. However, since they are never told what the problem is they must learn to cooperate and share information to 1) figure out what the problem is and 2) make use of the information they are given. Although this exercise can generate some puzzled expressions at first, it is an excellent way to teach the value of cooperation and effective communication. It also gives the participants an opportunity to experience the importance of identifying the problem, and using external representations to keep track of all the information in a problem - a topic which will be explored again in the next exercise.

Who

This activity is best for groups of 5-22.

Time Required

This exercise should take from 20-30 minutes.

Supplies Required

1. Clues to the mystery
2. A chalk board, flip chart, or other means for participants to share information.

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*(Adapted from Forsysth, D. R. and Pope, W. R., Instructor's Manual for An Introduction to Group Dynamics)

INTRODUCTORY EXERCISE

Directions

SOLVE THE MYSTERY

VERSION 2: MURDER

How

You should first cut out each of the clues and distribute them to the group. Depending on the size of the group, you may need to give some individuals more than one clue. If you are working with a group larger than 22 you may want to make extra copies of some of the clues. **HOWEVER, YOU MUST DISTRIBUTE ALL OF THE CLUES, REGARDLESS OF THE GROUP SIZE.**

Announce to the group:

"Please solve the problem. You may do whatever is necessary to solve the problem except show someone your piece(s) of information."

The group may ask questions such as may we read our information or may we write them on the board. Just repeat. "You may do whatever is necessary to solve the problem except show someone your information."

At first you should expect puzzled expressions, people trying to solve a problem based solely on their clue, mass confusion, etc. This is normal. It usually takes groups a while to realize that the clues are connected and then it takes additional time for them to realize that they need to find an effective way to share their information. Hopefully, they will discover at some point that they need to use some form of external representation such as a blackboard to effectively solve their problem.

You should give them adequate time to solve the problem. When you think that either as a group or the majority of the individuals have solved the problem, you should ask them to agree on a suspect.

Then you should discuss the correct answer.

Answer:

Bill Wiles is the murderer.

Ask the group the following questions.

- How did they reach a decision?
- What was the motive?
- Did he have the opportunity?
- How did they rule out other suspects?
- What other clues pointed to Bill Wiles?
- Were there clues that were either irrelevant or misleading, as there usually are in murder cases?

Then you want to discuss the process that just took place.

- Try to point out the weaknesses in their approach that may have made their efforts less effective.

- Try to get the participants to figure out how they could have been more effective problem solvers

Sample discussion questions

What happened initially?
Did they correctly identify the problem? Did they waste a lot of time before they identified the problem?
How did they define their goal? Did they realize they needed some type of external representation to keep track of all the information? If so, was it effective? If not, do they think that it would have made solving the problem easier?

This could lead into the exercise on external representation.

INTRODUCTORY EXERCISE

Clues Version 2

SOLVE THE MYSTERY

- The Problem: Who killed Bailey Winfrey?
- Bailey Winfrey, the victim, was a retired sea captain.
- Winfrey's ship was a whaler, but it also carried passengers.
- Winfrey, a powerful man, drank heavily and often brawled.
- Winfrey murdered H. Jones, a passenger on his ship, for his money.
- Jones' son, Paul, swore he would recover the money from Winfrey.
- Paul Jones had red hair, a mustache, and was weak and thin.
- Winfrey was killed at night in a cabin behind the main house.
- Two dirty glasses were on the table.
- Rum, but none of the other liquors from the cabinet, had been consumed.
- A tobacco pouch with the initials W. B. was found in the room.
- The groundskeeper was visiting relatives in Scotland on the night to the murder.
- Will Peters, the groundskeeper, walked with a limp.
- Bill Wiles had been one of the crewmen on Winfrey's ship.

INTRODUCTORY EXERCISE

Clues Version 2

SOLVE THE MYSTERY

- At the time of Jones' murder, Winfrey had refused to share any money with the crew.
- Winfrey had been harpooned--literally pinned to the wall by the shaft.
- Wiles needed money to pay a gambling debt.
- Mrs. Winfrey hated her husband.
- The stolen money was missing from the cabin.
- Jones was caught trying to break into the cabin the night after Winfrey's murder.
- Rum is the preferred drink of sailors.
- Skill and strength are required to operate a harpoon.

IMPROVE VERBAL REASONING EXERCISE

Why

This exercise is designed to show the participants how a mental skill such as verbal reasoning can be greatly improved by using an appropriate strategy. This demonstration is designed to motivate the participants and help them understand how the techniques taught in this course can improve success. Most students will experience a dramatic improvement in their ability to solve these types of problems. This improvement should increase their confidence and motivate them to be successful in the workshop.

Who

This activity is suitable for all size groups..

Time Required

This exercise should take from 15-20 minutes

Supplies Required

Pens or Pencils
Chalkboard or overhead projector with transparency of explanation
Practice Problem Handouts
Post-test Problem Handouts

Pre-Test Directions

IMPROVE VERBAL REASONING

How

For each attempt at pretest problem solving without the strategies, it is important to explain that the problem is initially difficult for almost anyone. They should try their best but shouldn't expect to do well. We recommend that all participants be allowed to keep written answers to themselves rather than hand them in to you--this makes the experience much less intimidating.

Announce to the group:

I am going to read several problems that I want you to try and solve. Don't worry if you have difficulty with these problems because many people are unable to solve them. We will discuss some ways to make them easier to solve later.

1. You are given a picture of your four newest patients and the following information. Sam is shorter than Phil but taller than Ed. Ed is shorter than Sam but taller than Larry. Which man is the tallest and which man is next to the tallest?

2. You must review the sales reports for the day that follows the day before yesterday. All you know is that two days from now will be Sunday? What day's sale's reports should you review?

After everyone attempts to solve the pretest problems, you can have a group discussion about the difficulty. Participants can discuss whether or not the problem initially seemed difficult without having to be specific about the types of errors they made.

Once people experience the fact that the problem can be difficult to solve, you can introduce them to appropriate problem solving strategies.

Strategy Training

IMPROVE VERBAL REASONING

How

Explain to the Group:

One reason people have difficulty solving the problems you just heard is that they often try to solve them in their head without using a paper and pencil to keep track of all the information in an effective way. There is just too much information in the problem for most people to remember and analyze at the same time. To solve these problems, you need to develop a scheme for keeping track of all the information and work through the problems step by step. Follow along with me as I show you what I mean.

Problem 1:

1. Sam is shorter than Phil

Tallest
Phil
Sam
Shortest

2. but taller than Ed

Tallest
Phil
Sam
Ed
Shortest

3. Ed is shorter than Sam

(same as above)

4. but taller than Larry

Tallest
Phil
Sam
Ed
Larry
Shortest

Phil is the tallest, Sam is the second tallest.

Problem 2:

1. Make a table with the days used in the description (in their normal sequence).

day before Yesterday
Yesterday
Today
tomorrow
two days from now

2. Look at the first statement and identify that day. "What day follows the day before yesterday". Mark this day because this is the goal.

day before Yesterday
→ **Yesterday**
Today
tomorrow
two days from now

3. Look at the next statement and record the information. "if two days from now will be Sunday"

	day before Yesterday
	Yesterday
	Today
	tomorrow
Sunday →	two days from now

4. Fill in the days of the week that correspond to your table, starting with Saturday

	day before Yesterday
Thursday →	**Yesterday**
Friday	Today
Saturday	tomorrow
Sunday →	two days from now

The answer is Thursday.

Practice Problems

IMPROVE VERBAL REASONING

Instructions: Have the students work in pairs and develop effective representations to solve each of the problems below.

You have just taken a new job. You are shown a picture from the company picnic and told that the shortest person in the picture is the company president and the tallest is the company vice-president. You are also given the following information. Wendy is shorter than Sue and Cheryl. Nancy is taller than Cheryl. Sue is shorter than Nancy but taller than Cheryl. What is the name of the company vice-president? What is the name of the company president?

You need to check the inventory list for yesterday. But all you know is the day before tomorrow is the day after Wednesday. What was yesterday?

Post-test

IMPROVE VERBAL REASONING

How

Announce to the group:

I am going to give you several problems to solve on your own now. I want you to use the strategy we just reviewed.

Pass out problems .

Discuss answers and note how many people improved from the pre-test to the post-test.

Answers:

1. Mike is shortest, Fred is second shortest
2. Sunday

Explain that the idea of a breaking a problem into parts and carefully representing the information in a problem can be effective strategies for a variety of problems we encounter like formulating a household budget, making a major purchase, learning new information, and analyzing any unfamiliar problem.

Post-test Problems

IMPROVE VERBAL REASONING

PROBLEM 1: If Bob and Fred are both taller than Mike, while George is shorter than Bob but taller than Fred, which man is the shortest and which one is next to the shortest?

PROBLEM 2: If the day after tomorrow is the day before Thursday what is yesterday.

Memory Improvement Exercise 1

USING INTERACTIVE IMAGERY

Why

This exercise is designed to show the participants how a mental skill such as memory can be greatly improved by using an appropriate strategy. This demonstration is designed to motivate the participants and help them understand how the techniques taught in this course can improve success. Most students will experience a dramatic improvement in their ability to remember. This improvement should increase their confidence. Exercise 1 should be less difficult for people with language difficulties than exercise 2.

Who

This activity is suitable for all size groups..

Time Required

This exercise should take from 15-25 minutes

Supplies Required

Pens or Pencils
Paper

Pre-Test Directions

MEMORY IMPROVEMENT USING INTERACTIVE IMAGERY

How

Announce the following to the class:

"We are going to do a memory test. I am going to see if you can remember how words are paired together. I will read you ten pairs of words and then give you the first word in the pair as a cue to remember the second word that was paired with it. Try to remember as many words as possible."

Read Word List # 1 to the class. Allow about 7 seconds between word pairs.

WORD LIST # 1

1. car balloon
2. elephant tree
3. fork leaf
4. pizza computer
5. diaper tire
6. telephone apple
7. television briefcase
8. potato vase
9. airplane monkey
10. boat cake

Now announce:

Now number your paper from 1 to 10 and after I read each word write down the word that went with it.

1. car
2. elephant
3. fork
4. pizza
5. diaper
6. telephone
7. television
8. potato
9. airplane
10. boat

Have the students check their work. By reading off the correct answers.

ANSWER KEY

1. car balloon
2. elephant tree
3. fork leaf
4. pizza computer
5. diaper tire
6. telephone apple
7. television briefcase
8. potato vase
9. airplane monkey
10. boat cake

DIRECTIONS FOR USING INTERACTIVE IMAGERY

MEMORY IMPROVEMENT USING INTERACTIVE IMAGERY

How

Announce to the class.

"I will now teach you a strategy to make this task easier.

" When I read the first word pair in the list, I want you to form a picture in your mind of the two words interacting. So, if the first word that I give you is flute and the second word is bun. You might imagine trying to play a flute with a bun stuck in the end. You will do the same general thing with the second word pair that I give you. If the second word pair that I give is you is penguin and shoe, you could imagine a penguin wearing shoes. You should make the images funny and/or unusual. The more unusual the image, the easier it should be to remember. So have fun with the exercise. I expect to see smiles and maybe even a few chuckles. Now please put down your pens and pencils and make the images in your head."

Post-Test Directions

MEMORY IMPROVEMENT USING INTERACTIVE IMAGERY

Announce the following:
"I am now going to read you another list of paired words. I want you to form interactive images of each pair as I read them".

Read the Word List # 2. Remember to pause 7 seconds between words.

Word List # 2

1. rabbit toaster
2. chair rope
3. pen umbrella
4. noodle camera
5. flame pillow
6. tomato hat
7. sock lamp
8. elevator donut
9. helicopter toothpaste
10. bicycle parachute

Announce the following:

"We will now test to see how well you can remember the word pairs. Write down the word that I give you and the word that goes with it."
Be sure to allow time for students to write down their answers and even a moment to think as you read each cue below.

1. rabbit
2. chair
3. pen
4. noodle
5. flame
6. tomato
7. sock
8. elevator
9. helicopter
10. bicycle

Have the students check their work. By reading off the correct answers

ANSWER KEY

1. rabbit toaster
2. chair rope
3. pen umbrella
4. noodle camera
5. flame pillow
6. tomato hat
7. sock lamp
8. elevator donut
9. helicopter toothpaste
10. bicycle parachute

Ask, "How many of you did better the second time around? (You may ask for a show of hands.) How many of you were able to recall all of the words the second time? (Again, you may want a show of hands.)

Announce the following:

"By learning a few simple techniques we can greatly improve our memory. This is just one example of how learning simple strategies can make your life easier. This course will present many such techniques."

Memory Improvement Exercise 2

USING THE PEGWORD SYSTEM

Why

This exercise is designed to show the participants how a mental skill such as memory can be greatly improved by using an appropriate strategy. This demonstration is designed to motivate the participants and help them understand how the techniques taught in this course can improve success. Most students will experience a dramatic improvement in their ability to remember. This improvement should increase their confidence. Exercise 2 is a little more complicated than exercise 1 and should probably not be used if participants have language difficulties.

Who

This activity is suitable for all size groups..

Time Required

This exercise should take from 15-20 minutes

Supplies Required

Pens or Pencils
Peg Word System Handouts

Pre-Test Directions

Memory Improvement Using the Pegword System

How

Announce the following to the class.

"We are going to do a memory test. I am going to see if you can remember the words which correspond to specific numbers. Pretend that these words represent the most often ordered supplies of your company in order. Then, I will say give me the seventh word, the fifth word, the tenth word, and you should write down those words. Put down your pens and pencils. I will give you a list of ten words and I want you to remember as many as possible."

Read Word List # 1 to the class. Allow about 6 seconds between words.

WORD LIST # 1

1. pencils
2. paper
3. telephones
4. toilet paper
5. Paper clips
6. scissors
7. chairs
8. desks
9. pens
10. folders

Now announce:

"We are going to recall the most ordered supplies for the company. Write down the number that I give you and the word that goes with it."

Be sure to allow time for students to write down their answers and even a moment to think as you call off each number below.

5, 3, 8, 1, 7, 10, 2, 4, 9, 6

Have the students check their work. By reading off the correct answers.

ANSWER KEY

5. Paper clips
3. telephones
8. desks
1. pencils
7. chairs
10. folders
2. paper
4. Toilet paper
9. pens
6. scissors

DIRECTIONS FOR THE PEG WORD SYSTEM

MEMORY IMPROVEMENT USING THE PEGWORD SYSTEM

How

Hand out the peg word system.

Announce to the class.

"I will now teach you a strategy to make this task easier. Look at the Peg word system that I just gave you. Each word in the list rhymes with a number making it easy to remember if you are given a specific number."

" When I read the first word in the list, I want you to form a picture in your mind of that word interacting with the word that rhymes with one (Bun). So if the first word that I give you is flute. You might image trying to play a flute with a bun stuck on the end. You will take the second word that I give you and have it interact with the word that rhymes with two (shoe) and so forth. If the second word that I give is you is penguin, you could imagine a penguin wearing shoes. You should make the images funny and/or unusual. The more unusual the image, the easier it should be to remember. So have fun with the exercise. I expect to see smiles and maybe even a few chuckles. For today you may look at the Peg Word List that I gave you, but please put down your pens and pencils and make the images in your head. We are now going to pretend that the words that I am about to give you are the top ten product sold by your company which has a very diverse line of products."

Post-Test Directions

Memory Improvement Using the Pegword System

Read the Word List # 2. Remember to pause ten seconds between words.

Word List # 2

1. Eye glasses
2. milk
3. pillows
4. turkeys
5. trumpet
6. helicopter
7. car
8. dryers
9. eggs
10. Rings

Announce the following:

"We will now test to see how you did. Write down the number that I give you and the word that goes with it."

Be sure to allow time for students to write down their answers and even a moment to think as you call off each number below.
8, 6, 1, 3, 10, 9, 2, 7, 4,5

Have the students check their work. By reading off the correct answers

ANSWER KEY

8. dryer
6. helicopter
1. Eye glasses
3. pillows
10. rings

9. eggs
2 milk
7. car
4. turkeys
5. trumpet

Ask, "How many of you did better the second time around? (You may ask for a show of hands.) How many of you were able to recall all of the words the second time? (Again, you may want a show of hands.)

Announce the following:

"By learning a few simple techniques we can greatly improve our memory. This is just one example of how learning simple strategies can make your life easier. This course will present many such techniques."

PEG WORD SYSTEM

MEMORY IMPROVEMENT USING THE PEGWORD SYSTEM

One is a bun

Two is a shoe

Three is a tree

Four is a door

Five is a hive

Six is a stick

Seven is heaven

Eight is a gate

Nine is a dime

Ten is a hen

A Comprehension Problem Involving A Quote from Bacon (1920)

Read the quote below to people and if they understand it (most won't). What do they need to solve it? Someone will want to see it written out--let everyone see it in writing and try to figure it out.

The unassisted hand and the understanding left to itself possess but little power. Effects are produced by means of instruments and helps, which the understanding requires no less than the hand.

Sir Francis Bacon, 1620

Bacon's statement is worded strangely by today's standards--it represents a good example of a "comprehension problem". Ask participants for their interpretations. Since this wording is strange, no one needs to feel badly if they don't interpret it properly.

A good strategy to suggest is "break the problem into parts". One way to do this is to proceed sentence-by-sentence. A different use of this strategy is to first focus on the concept of "the unassisted hand" and understand what Bacon has to say about that. Then focus on what he says about "the understanding" and its relationship to "the unassisted hand".

Our interpretation of Bacon's basic point is as follows: Just as we need physical tools to perform most physical feats, we also need "mental tools" (e.g., mental strategies) to perform most mental feats.

The reason we need "mental tools" is that human's working memory capacity is limited---we can only attend to a limited amount of information at once . For example, it was difficult to simply listen to Bacon's quotation and hold everything in working memory so that you could analyze it. You needed to see the information written down so that you could return to it.

The good news about human's limited capacity for attention is that this allows us to focus our attention on details. The bad news is that we need additional inventions to help us think more effectively. A high level invention is the invention of written language. This allows us to do a number of things that we couldn't do without it. Without written language, it is very difficult for societies to solve the kinds of mathematical, scientific and comprehension problems that our society solves today

A Note about "Metacognition" and the Identification of Potential Problems

You might want to point out to people that there is a very important aspect of their problem solving that they probably take for granted. Ask participants to think about their reactions when you read them (i) the Bacon quote ,(ii) the statement about the relative heights of the president, vice president and other members of the company, and (iii) the list of people (e.g. the person with the cowboy boots) and what they sell (e.g., pianos). All participants probably realized that they couldn't solve these problem simply by listening to the information once. In short,they identified that a problem existed and realized the need to do something such as write things down or use memory strategies. If problems are not identified, people take no steps to solve them and fail later on.

Studies with young children (e.g. kindergarten and first graders) show that they often don't identify the existence of memory and comprehension problems. For example, Vanderbilt researchers gave first graders a set of secret knocks that were used by each of 10 different characters. Each character had a different secret knock. Students heard the knocks for each character and were then asked if they were ready to solve the problem of deciding who was at the door when they heard particular knocks. Nearly all of them were very excited by the task and very confident that they were ready for the test after hearing all 10 knocks only once. In short, they failed to identify the existence of a problem with their own memories.

After trying the task of listening to each knock and saying whose it was, the children realized that they needed more practice. Eventually, they learned to write down the knocks and represent them on paper. This allowed them to perform the task perfectly. Initially, however, they did not realize that a memory problem existed that they needed to solve.

The important point is that the ability to identify potential problems with our abilities to comprehend and remember is crucial for problem solving. This ability is often called "metacognition" (e.g., cognition about the state of our own cognitive processes). Even college students often fail to engage in appropriate kinds of "metacognitive" activities and hence arrive unprepared for tests. We will explore issues of metacognition as we proceed.

Encouraging Participants to Leave a Legacy

An excellent way to build motivation is to encourage participants to "leave a legacy" that can help others who follow in their footsteps. Ask them to keep track of reactions they have to various lessons and examples. Ask them to bring examples of interesting problems and solutions to class, and so forth. Ask them to think about sharing with others the problem(s) that they choose to work on and their experiences doing it. These types of ideas, and others, can then be added to the resources for this workshop and shared with others who take the course later on.

As the trainer, you can invite conference participants to publish their own insights and problems as additions to your resources. By helping them edit their publications, you can help them learn to develop their communication skills. The chance to publish materials that can be used by others in their company is motivating as well.

It is possible, down the line, that The IDEAL Workplace may establish a World Wide Web site where ideas and insights can be shared throughout the world. For the moment, however, it is sufficient to ask participants to create something that they feel will help others in their company who want to increase their abilities to solve problems and learn.

The materials can be published in a variety of formats. The simplest is text. However, audiotapes and videotapes can also be created. In some settings, so can multi-media presentations.

The idea of leaving a legacy can become the final project for this workshop. It is something that can be thought about during each session so that ideas evolve systematically. In addition to being motivating, the goal of leaving a legacy is excellent for team'building as well as for individual learning. Learning is enhanced when individuals continually ask themselves what they are finding valuable and what they want to contribute to the overall discussion. A sense of team is enhanced when people work together to accomplish a common goal.

ASSESSMENT EXERCISE

INTERVIEWING

Why

The purpose of this exercise is to enhance communication skills and to help participants get to know each other. They will interview each other about information and will report the information back to the group. Some of the questions will encourage the participants to focus on the workshop and what they want to gain from it.

Who

This activity works best for groups of 40 or less.

Time Required

Time will vary depending on the size of the group. For larger groups you can save time by having the participants report back to subgroups instead of the entire group.

Supplies Required

Copy of required questions. These can be on a board, overhead, or a copy can be given to each participant.

INTRODUCTORY EXERCISE
Directions
INTERVIEWING

How

5. Divide the participants into pairs. For odd numbers of participants, you may place three in a group or the trainer may participate.
6. Instruct the participants that they should interview their partner. Tell them that they will have ____ number of minutes to get to know their partner and they will then be expected to introduce their partner to the group.
7. They may ask any questions which they like but they should also obtain information for the required questions.
8. Each individual will then introduce their partner to the group.

Required Questions

1. What is your name?
2. What are you most interesting in getting out of this workshop?
3. What is your biggest problem?

Module 2

INTRODUCTION TO THE IDEAL FRAMEWORK

IDENTIFYING PROBLEMS

The goal of this module is to begin the process of helping people learn a systematic (rather than hit-and-miss) approach to problem solving. The module is designed to (a) help people understand why they need to learn to solve problems on their own (rather than just learn solutions discovered by others), and (b) provide an overview of the IDEAL approach.

The major focus is on the ***Identify problems*** component of IDEAL. This is a frequently-neglected aspect of problem solving. However, it sets the stage for creative thought, action and invention.

Goals

- Explain IDEAL Framework
- Identify problems
- Improve Creativity
- Explore strengths and weakness
- Promote group interaction

Exercise & Resource Options for Module 2

Resource#	Name	Purpose
B 1	Explanation of IDEAL model	Explain the basic model of problem solving
B 2	Problem Iden. Explanation	Explain that often overlooked
B 3	Problem Iden. Exercise	Show value of identifying problems
B 4	Analyze Objects Exercise	Link Problem Identification & Invention
B 5	Radio Play: Fear Strikes Out	Explore issues of Problem Identification
B 6	Identify Own Problems	Get participants involved

Module 2: INTRODUCTION TO IDEAL

I. Summary of Lesson I and Overview of II

Lesson 1 was designed to provide a general introduction to the workshop. We discussed the importance of problem solving , and we explored some examples of strategies (what Bacon called "mental helps") that illustrate how problem solving can be improved.

In this workshop we're going to learn an approach to problem solving rather than only learn a set of strategies that others have invented. You have all probably heard the saying: You can give a man a fish and he will eat for one day, or you can teach him how to fish and he can eat for a lifetime." The same principle applies here. You can be given strategies that others have invented to solve problems, or you can learn to solve problems on your own.

Actually, we will do some of both. In the story about learning to fish, it doesn't seem bad to give a man some fish while he's learning to fish on his own--otherwise he might starve. Similarly, we will discuss a number of strategies for solving problems that have been discovered or "caught" by others. But our primary focus will on an approach to problem solving that helps us learn how to generate our own solutions to problems. There are at least three reasons why.

First, a problem in one setting is usually not identical to that "same" problem in another setting. Consider the problem of employee training. Training new employees to work in a police department is not the same as training them to work as cashiers in a grocery store. And training people to work as cashiers at a small grocery store can be quite different from training them to work in a large store. In the small store, things like knowing people's names and family members can be more important than knowing how to quickly use the checkout technology. If a small store simply adopted the training strategies invented by a large store, they would probably regret it later on.

A second, related reason why we need to know how to generate our own solutions to problems is that what works best in one setting is not necessarily the best solution in another setting. For example, an effective use of computer technology to solve scheduling problems in one company may completely fail in another because the second company does not have a group of technicians to help fix computers when they break.

A third reason why we need to know how to generate our own solutions to problems is that problems that we encounter will continually change as the world changes -- as we hire new people, modify or change product lines and so forth. We can't afford to wait for others to generate solutions to our problems. We need to learn to generate them ourselves.

For all these reasons, learning about other people's solutions to particular problems is important, but it is not as useful as learning to generate new solutions on our own. We'll focus on both, but the primary emphasis will be on generating our own. Important opportunities to learn will come from each of us sharing various problem solving strategies. By doing so, we will each expand our realization of what is possible.

2. Discuss IDEAL Problem Solving

The framework we will use to develop a systematic approach to problem solving is called the IDEAL Framework. Explain the IDEAL Framework. You can use the discussion of IDEAL that is provided in *Notes to the Trainer* as well as in *Resources* for this chapter, or you can use the shorter description of IDEAL that is presented below.

I stands for **Identify Problems and possible opportunities for success.**

Creative people tend to notice problems that others might ignore or avoid and to treat those problems as opportunities for creative problem solving. Have you ever thought about where people came up with ideas for inventions like the ball-point pen or the Xerox machine? Well, each of these ideas began with someone noticing a problem that others either ignored or thought was unsolvable. In the first lesson we will concentrate on problem identifcation. It is one of the most underappreciated aspects of successful problem solving. We will focus on identifying potentially solveable problems in our environment, as well as identifiying potentially problematic beliefs and attitudes that may be hindering our personal success.

As we proceed through this workshop, you will be asked to identify potentially solvable problems relevant to you and your workplace. Later we will help you turn some of these problems into opportunities for creative problem solving.

D stands for **Define alternative goals and develop an understanding of the problem.**

Creative people tend to define a variety of alternative goals once a problem is identified. You will be exploring the important effects that different goals can have on learning and creative problem solving later in the workshop. As we pursue our goals we will want to develop a better understanding of the problem and perhaps modify those goals. Also, it is important to understand that goals are not strategies. Goals are what we want to accomplish, strategies are how we accomplish our goals. Also, we may want to ask ourselves what are the causes of the problem to help us develop a better understanding of the problem.

E stands for **Explore Strategies.**

Successful problem solvers try to explore a variety of strategies that might help them accomplish their goals. Sometimes they must learn new strategies or acquire new skills and information from other sources.

A stands for **Anticipate and Act**

Successful problem solvers also try to anticipate the consequences of using specific strategies so they can reduce the likelihood of failure. But, they must also have the courage to act on their best strategy if they are to be successful. In the coming lessons we will explain specific ways you can help anticipate the effects of using particular strategies and increase your courage span.

L stands for **Look Back and Learn**

Successful problem solvers look back at the effects of their attempts to solve the problem and try to learn from their mistakes. If we can avoid the same mistakes in the future we will certainly be more successful.

These basic activities form what is called the IDEAL problem solving framework. It can seem realtively simplistic at first, but it becomes much more meaninful as you practice using it. We will use the IDEAL framework throughout this program to help you become more successful in solving a wide variety of problems.(Resources includes a page that can be turned into an overhead or handouts on the **IDEAL** model to use as your present the above information)

3. The Importance of Identifying Problems and Treating Them as Opportunities

The primary focus of this lesson is on the initial stage in the IDEAL model--identifying potentially solvable problems and treating them as opportunities for invention. This is an aspect of problem solving that is under - appreciated by most people. If we don't identify situations as potentially solvable problems we either see them as "necessary facts of life" or we don't even recognize them as problems. Either way, we don't take steps to remedy anything.

In the last session we briefly discussed the concept of "metacognition" (cognition about the state of one's own cognition) and noted how important it is for successfully solving problems. You were presented with information to understand and/or remember and realized almost immediately that you couldn't solve the problem of comprehending or remembering without taking action and doing something (e.g., asking for a written version of the Bacon quote, using imagery strategies, etc). In short, you identified the existence of a problem.

In contrast, we noted that young children faced with a similar task (the "secret knock" game) rarely realized that a problem existed until they actually tried to perform. A similar situation often occurs when people prepare for tests. Many don't realize that they are underprepared until they take the test. Then it's too late.

In many cases, problem identification is often looked on negatively--it is associated with complaining. However, the most valuable people in a group or company can be the ones who identify the existence of potential problems before others realize their existence.

Think of how many mistakes and even disasters could have been avoided if people had identified the existence of problems ahead of time. (You might have participants generate some examples). Examples include : Problems with the O rings in the Challenger space disaster; The Coca Cola Company's decision to take classic coke off the market a few years ago; The Radio Station's decision to by handguns from people for $100.00 each (this example is discussed in Notes to the Trainer). And so forth.

Many "simpler" examples of problem identification are also very important. For example, someone may realize that two highly personal memos have been mixed up and are about to be sent to the wrong persons. An author on the verge of publishing his book may discover that he has consistently used the word "effect" when he should have used "affect" (note that spell checkers on computers will not catch this error). A new secretary may realize that the way he has been handling phone messages for people is going to be problematic because he has neglected to state who was calling or why but, instead, has only forwarded phone numbers. In all these cases and more, the ability to identify potential problems is extremely important.

4. Problem Identification and Creativity:

Problem Identification is also linked to creativity and "taking initiative". There are several ways to help participants appreciate this point.

- **The "Generating Inventions" exercise.**

This exercise (see *Resources*) first asks people to simply "generate new inventions". Later they are asked to begin by first thinking of problems that people encounter that need solutions. Beginning with an analysis of problems in particular areas usually results in the generation of more inventions. "Gadget catalogs" are full of inventions designed to solve problems that many people face.

- **"Analyze the Room" exercise.**

You can expand on the point about "gadget catalogs" and invention by asking people to analyze everything in their room from the perspective of the problems that it solves. Eveything should solve a problem that people recognize (e.g. chairs, roofs, chalk, blackboards, doors, lights, etc.)

- **"Analyzing Inventions" exercise.**

This exercise (see *Resources*) further extends the discussion of inventions and problem identification by asking participants to say if gadgets are just gimmicks, or if they solve real problems. Many of these gadgets are really fun.

5. A Case Ilustrating Problem Identification

You can let participants try their hand at problem identification by inviting them to listen to the radio place case "Fear Strikes Out". In this case, detective March visits the Whambat Company to help the CEO solve a problem. Ask participants to listen to the case (it takes about 10 minutes) and, while doing so, to try to identify the problems that exist in the company. As they'll discover, the problems that are identified look different to the CEO and to Inspector March. This is important for participants to realize.

Basically, the CEO identifies problems such as "we have had no new inventions in several years", "morale is extremely low", "employees are turning into "yes" men and women rather than providing honest feedback. The CEO also comes up with the interpretation of these problem; namely, that the employees are all "slackers". (Note that the interpretation of problems involves the second step in IDEAL, which is to develop an understanding and define goals. You do not need to go into this at this point).

Inspector March knows that a problem exists because he was invited by the CEO. However, March identifies some different problems that are identified by the CEO. For example, March notices that people seem very rushed because they receive demerits for loafing. They don't discuss issues a lot because the motto is "Nothing to it but to do it". They are constantly watched and mistakes are not tolerated, etc. Overall, problem identification from March's perspective is different from the problems identified by the CEO.

It is also noteworthy that the CEO has at least identified a large issue (no new inventions and hence no new revenue stream) prior to the time when this could sink his company. Many companies have gone under because leaders failed to identify the existence of a problem such as "no new revenue stream" until it was too late. Then they went bankrupt.
Participants may have similar stories to share.

6. Summary and Next Time

The goals of this lesson were to (i) explain why we need a systematic approach to problem solving rather than simply learn a list of strategies invented by others; (ii) provide a brief overview of the IDEAL Framework that we will use to approach problem solving systematically, and (iii) focus on the importance of identifying problems. Problem identification is often frowned upon yet is extremely important. It can help us avoid disasters and embarrassments in the future. And it can help help us think of creative ways to solve problems that we and others confront.

Different people viewing the same situation will often identify different problems because of the perspective they bring to the situation. The radio play "Fear Strikes Out" illustrates this from the CEO and Inspector March.

Most of the problems we have focused on so far are problems that occur with others or with things in our environment. It is also important to attempt to identify problems with our own beliefs and skill levels that, if solved, could have a powerful effect on our future. It takes courage to do this, but the results are worth the risk. We'll focus on this issue next time.

EXPLANATION OF THE IDEAL MODEL

Although there are no quick fixes for becoming a successful problem solver - psychologists have learned that people who are creative and good at solving unusual problems use certain simple and yet powerful thinking techniques. In this program you will learn to use this same powerful framework for solving problems - a framework that can be applied to any type of problem from learning new information to improving your communication skills.

The framework you will be learning to use forms an easy to remember acronym, the word ***IDEAL***. Each letter in ideal represents an important step in the problem solving process. Let's briefly explore this model.

I stands for Identify Problems and possible opportunities for success.
Creative people tend to notice problems that others might ignore or avoid and to treat those problems as opportunities for creative problem solving. Have you ever thought about where people came up with ideas for inventions like the ball-point pen or the Xerox machine? Well, each of these ideas began with someone noticing a problem that others either ignored or thought was unsolvable. In this workshop you will begin to identify deficient skills that may be hindering your future success in life. We will also ask you to identify problems in the workplace and the home. Later we will help you turn some of these problems into opportunities for creative problem solving.

D stands for Define alternative goals and develop an understanding of the problem.
Creative people tend to define a variety of alternative goals once a problem is identified. You will be exploring the important effects that different goals can have on learning and creative problem solving in later sessons. As we pursue our goals we will want to develop a better understanding of the problem and perhaps modify those goals. Also, it is important to understand that goals are not strategies. Goals are what we want to accomplish, strategies are how we accomplish our goals. Also, we may want to ask ourselves what are the causes of the problem to help us develop a better understanding of the problem.

E stands for Explore Strategies.
Successful problem solvers try to explore a variety of strategies that might help them accomplish their goals. Sometimes they must learn new strategies or acquire new skills and information from other sources.

A stands for Anticipate and Act
Successful problem solvers also try to anticipate the consequences of using specific strategies so they can reduce the likelihood of failure. But, they must also have the courage to act on their best strategy if they are to be successful. In the coming lessons we will explain specific ways you can help anticipate the effects of using particular strategies and increase your courage span.

L stands for Look Back and Learn
Successful problem solvers look back at the effects of their attempts to solve the problem and try to learn from their mistakes. If we can avoid the same mistakes in the future we will certainly be more successful.

These basic activities form what is called the IDEAL problem solving framework. We will use this framework throughout this program to help you become more successful in solving a great variety of problems.

(On the next page is a page that can be turned into an overhead or handouts on the **IDEAL** model to use as your present the above information)

IDEAL PROBLEM SOLVING MODEL

I - Identify Problems and possible opportunities for success

D - Define alternative goals

E - Explore Strategies

A - Anticipate and Act

L - Look Back and Learn

(From *The Ideal Problem Solver*, Bransford & Stein, 1994)

The Importance of Identifying Problems and Treating Them as Opportunities

Actively attempting to Identify potentially solvable problems is an aspect of problem solving that is under - appreciated by most people. If we don't identify situations as potentially solvable problems we either see them as "necessary facts of life" or we don't even recognize them as problems. Either way, we don't take steps to remedy anything.

In many cases, problem identification is often looked on negatively--it is associated with complaining. However, the most valuable people in a group or company can be the ones who identify the existence of potential problems before others realize their existence.

Think of how many mistakes and even disasters could have been avoided if people had identified the existence of problems ahead of time. (You might have participants generate some examples). Examples include : Problems with the O rings in the Challenger space disaster; The Coca Cola Company's decision to take classic coke off the market a few years ago; The Radio Station's decision to by handguns from people for $100.00 each (this example is discussed in Notes to the Trainer). And so forth.

Many "simpler" examples of problem identification are also very important. For example, someone may realize that two highly personal memos have been mixed up and are about to be sent to the wrong persons. An author on the verge of publishing his book may discover that he has consistently used the word "effect" when he should have used "affect" (note that spell checkers on computers will not catch this error). A new secretary may realize that the way he has been handling phone messages for people is going to be problematic because he has neglected to state who was calling or why but, instead, has only forwarded phone numbers. In all these cases and more, the ability to identify potential problems is extremely important.

4. Problem Identification and Creativity: Problem Identification is also linked to creativity and "taking initiative". Exercises in this section help participants appreciate this point.

PROBLEM IDENTIFICATION EXERCISE

Why

This exercise is designed to help people understand the importance of identifying problems. All to often society discourages people from identifying problems. Eventually people start ignoring problems or accepting things even though they could probably be improved. Helping people notice problems is the first step toward becoming more creative.

In this exercise we first ask people to come up with ideas for inventions. Most people can come up with one or two ideas and then they seem to exhaust their creativity. In the second phase of this exercise, we will first encourage people to identify problems that they normally encounter in their environment and see how many of those problems can be turned into ideas for innovative products.

Who

This activity is suitable for all groups

Time Required

This exercise should take from 25-35 minutes.

Supplies Required

Pens or Pencils
Copies of worksheets 1 & 2 for each participant

PROBLEM IDENTIFICATION EXERCISE
Directions

How

Pass out Worksheet 1 and announce to the group:

I want you to assume that you have been hired by a new company to come up with ideas for new products. You should make a list of all the good ideas for inventions or innovative products that you can. Pass out copies of Worksheet 1.

Allow participants 5-10 minutes to write down their ideas.

Pass out Worksheet 2 and announce to the group:

Now I want you to identify as many problems as you can think of in each of the areas listed on Worksheet 2. Don't do anything with the second column yet. If you think one of the categories does not apply to you, you can change it to something else.

Allow participants about 5-10 minutes to write down their problems.

Have the participants form groups of 3-4 people if possible. Instruct the groups to look at each problem and evaluate whether or not they think it could be turned into an idea for an innovative product. Allow participants about 15 minutes to write down their responses.

Lead a discussion of how many more ideas participants were able to come up with for innovative products when they began by identifying problems. Discuss what implications they think this may have for improving creativity. How it might be applied to their workplace?

PROBLEM IDENTIFICATION EXERCISE

Worksheet 1

List your ideas for innovative products below.

1)

2)

3)

4)

5)

6)

PROBLEM IDENTIFICATION EXERCISE

Worksheet 2

Identify Problems with:	Possible Innovative Products
Your Work 1) 2) 3) 4)	
Working around the House 1) 2) 3) 4)	
Operating your Car 1) 2) 3) 4)	
Taking care of your children 1) 2) 3) 4)	
Cooking 1) 2) 3) 4)	

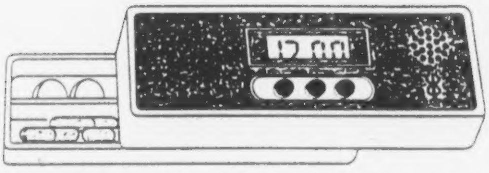
ANALYSIS OF EVERYDAY OBJECTS AND GADGETS

Purpose: Help people see the relationship between problem identification and invention.

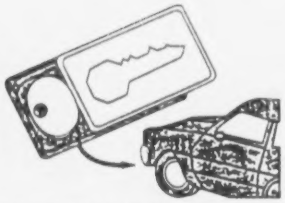
Version 1: Analyze objects in the room (desks, chairs, lights, doors, chalk, etc.) from the perspective of the problems they solve.

Version 2: Analyze objects from catalogs like the ones that appear on the next pages. For many of the objects (e.g., the talking scale), it can be fun to ask if they are gimmicks or solve real problems.

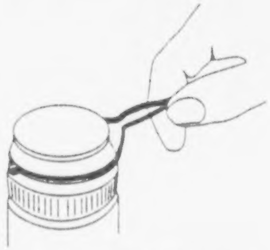
Ask people to discuss some of their favorite inventions (in terms of solving problems). They might bring examples to class throughout the workshop.



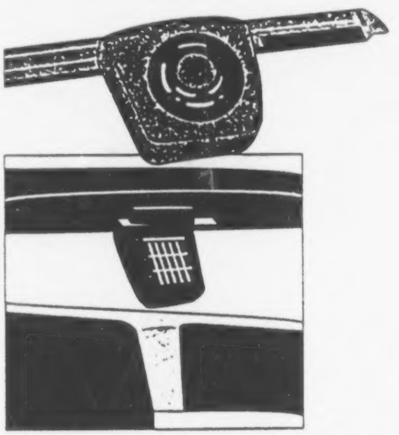
MEDICINE CLOCK. Set this little pill-box alarm to ring every ½, 1, 2, 4, 8, or 12 hours, and it plays a little song to remind you to take your medicine.



DON'T LOCK YOURSELF OUT OF HOUSE, CAR! Magnetic cases hide spare keys safely.



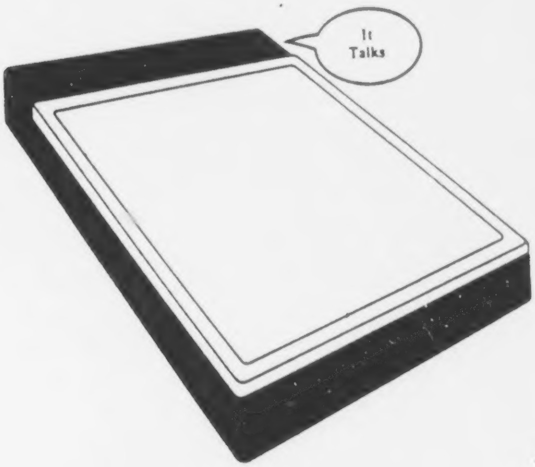
A QUICK TWIST opens the most stubborn jars and bottles!



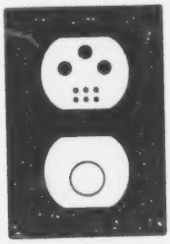
SOLAR-POWERED CAR VENTILATOR. Reduces heat build-up without leaving windows open.

Are the inventions shown below simply gimmicks, or do they address real needs?

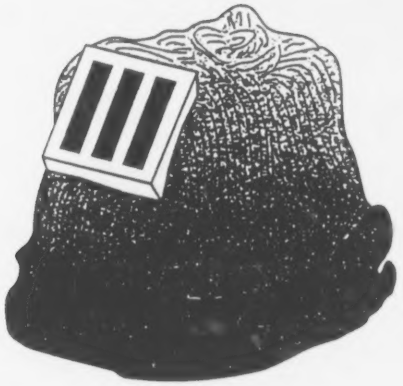
Talking scale that remembers your weight:



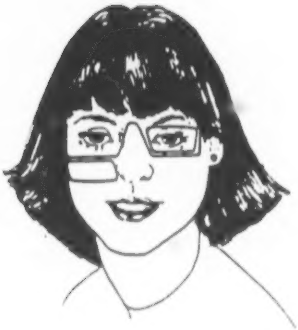
Sound-activated light switch:



Solar watch cap:



4.



5. What kind of problem were these inventions designed to solve?

? . , !

ANSWERS TO EXERCISES

1. The inventors of the talking scale seem to have identified some real problems that people face. For example, an advertisement for a talking scale we saw asks

> Can't see over your tummy?
> Can't read the numbers way down there?
> Can't remember whether you lost weight?

However, there may be some situations in which you would not want to use this scale. For example, many people would not want their weight revealed in places where others might hear it.

2. The inventors of the sound-activated light switch also identified some problems that this device can help people solve. In particular, it can

> Hear you coming and switch on, so you won't come home to a dark house or garage.
> Surprise burglars who enter your house.

3. The description of a solar watch cap reads, "Warms head nicely.... Collector must face south for optimum heating effect, so rotation of hat or wearer may be necessary in extreme cold." This item is from a collection of humorous gadgets in A. Gingold, *Items from our Catalog*, New York: Avon Books, 1982.
4. These flip-down makeup glasses. They consist of magnifying glasses on hinges that can be flipped down on one side when the wearer wants to apply makeup or put on a contact lens, allowing her to see through the other eye.
5. Punctuation marks are designed to solve a general problem with written language, which is that it loses pauses and tones of voice that convey questions, exclamations, and so forth.

A Radio Play Case Illustrating Problem Identification: Fear Strikes Out

You can let participants try their hand at problem identification by inviting them to listen to the radio place case "Fear Strikes Out". In this case, detective March visits the Whambat Company to help the CEO solve a problem. Ask participants to listen to the case (it takes about 10 minutes) and, while doing so, to try to identify the problems that exist in the company. As they'll discover, the problems that are identified look different to the CEO and to Inspector March. This is important for participants to realize.

Basically, the CEO identifies problems such as "we have had no new inventions in several years", "morale is extremely low", "employees are turning into "yes" men and women rather than providing honest feedback. The CEO also comes up with the interpretation of these problem; namely, that the employees are all "slackers". (Note that the interpretation of problems involves the second step in IDEAL, which is to develop an understanding and define goals. You do not need to go into this at this point).

Inspector March knows that a problem exists because he was invited by the CEO. However, March identifies some different problems that are identified by the CEO. For example, March notices that people seem very rushed because they receive demerits for loafing. They don't discuss issues a lot because the motto is "Nothing to it but to do it". They are constantly watched and mistakes are not tolerated, etc. Overall, problem identification from March's perspective is different from the problems identified by the CEO.

It is also noteworthy that the CEO has at least identified a large issue (no new inventions and hence no new revenue stream) prior to the time when this could sink his company. Many companies have gone under because leaders failed to identify the existence of a problem such as "no new revenue stream" until it was too late. Then they went bankrupt.

Participants may have similar stories to share.

Please identify some problems that you feel are important and would like to solve.

Module 3

Understanding Ourselves as Learners

Identifying Positive and Negative Beliefs and Learning Styles

The purpose of this lesson is to use the IDEAL framework to better understand ourselves as learners and problem solvers. We do so by identifying beliefs and learning styles that can either help or hinder us in our efforts to improve.

Identifying problems with our own beliefs and strategies is often more difficult than identifying problems that do not involve us personally. Nevertheless, this is one of the most important steps in helping people improve. It requires that people develop healthy courage spans".

Goals

- Identifying Problems
- Exploring attitudes about learning
- Identifying strengths and weaknesses
- The importance of expertise
- Exploring learning styles

Exercise & Resource Options for Module 3

Resource#	Name	Purpose
C1	Two Trains Exercise	Help people assess their reaction to different problems
C2	Radio play: The Good Guest	Good model of tackling a personal problem
C3	Ideas on intelligence, etc.	Help people identify erroneous beliefs
C4	Demonstration of expertise	Reveal effects of knowledge on memory
C5	Combination Lock Exercise	Different learning styles
C6		
C7	Skill assessment inventory	Identify their strengths & weaknesses
C8	Skill Hunt	Explore strengths & weaknesses

Module 3: Understanding Ourselves as Learners: Identifying Positive and Negative Beliefs and Learning Styles

1. Review of Last Time and Overview of this Lesson

In lesson III we discussed The IDEAL Framework and focused on its first component: the Identification of problems that represent opportunities for invention and improvement.The problems in Lesson III involved problems that were "outside" us; they occurred with others or in our environment. The purpose of this lesson is to use the IDEAL framework to better understand ourselves as learners and problem solvers. We will do so by again focusing on the Identify component of IDEAL. We will attempt to identify both positive and problematic personal beliefs, styles and and levels of skill that can either help or hamper our efforts to solve problems and learn.

2. Exploring Our Reactions to Problems

The purpose of the exercise below is to help people identify potential problems with their own approaches to problem solving. What do they do when they encounter difficulty? How do they feel?

• **The Two Trains and The Bird Problem:** This problem is available in *Resources*. It is an excellent problem to ask people to solve. As they are doing so, ask them to write down the thoughts they are having as they attempt to solve it. How do they feel about these kinds of problems? How difficult is the task for them? Are they worried whether they get the problem right or not? Ask participants to write down their thoughts right after they read the problem (or perhaps after you read it to them). Ask them to write again after they have worked for about 3 minutes. After 5 minutes (maximum), ask people to hand in the problem. Right before they do, again ask them to write down their thoughts.

Many people's thoughts will be very negative. Their attention is on what might go wrong rather than on the problem at hand. As a result, they spend more time worrying about negative things than they do about solving the problem.

Examples of thoughts from others attempting to solve the Two Trains problems are available in *Resources*. It can be useful to share these thoughts with participants. Hopefully, they will then share some of theirs.

Some people love tackling problems like the Two Trains problems--usually because they are good at them. Chances are, however, that there are other types of problems that they try to avoid.

Try to get everyone to think of instances where they realize they "bailed out" of a situation because they wanted to avoid looking foolish. How often do such attitudes hinder our abilities to learn?

A good example of such a situation is the **Sports/Dance Example** in *Resources.* This represents an actual case of a person who was good in math and sports and felt pretty confident in his ability to tackle tough problems. Then he encountered a "learning to dance" problem and learned a valuable lesson about himself. Since no one can do everything, all of us encounter things that initially are difficult. How we react is the true test of whether we ultimately will learn.

3. An Optional Case Involving the Identification of Problems with Oneself

The radio play Case "The Good Guest" (see the *Cases* section of *Resources*) is excellent for illustrating the importance of identifying problems with ourselves that represent opportunities for improvement. In this case, Inspector March comes to realize that he is the cause of many problems that he sees. Rather than try to deny them or to run away from the situation, March handles it with courage.

Ask participants to discuss what they think of March. Is he viewed as horrible for having created the problems? Is he looked on as weak for having acknowledged that the problems exist? Our interpretation is that March comes off as strong and successful and represents a good model for all of us.

4. Some Beliefs That Affect Learning and Problem Solving

Researchers have found that beliefs about ideas such as "intelligence" and "expertise" can have important effects on people's learning and problem solving . *Resources* includes information relevant to these beliefs. You can present this information to participants yourself. Alternatively, you can have them divide into groups, where each group is given the responsibility to learn about one of the concepts, present it to the rest of the group, and discuss its relevance to problem solving.

Resources also includes a demonstration experiment on "expertise and memory" that is very powerful. It helps people understanding how the knowledge they currently possess makes tasks such as remembering either easy or difficult.

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5. Identifying Personal Strengths and Weaknesses

Effective problem solvers are also able and willing to identify particular strengths and weaknesses that they have in learning and solving problem.

- **Assessments of Strong vs. Weak Learning Styles**

Some of peoples' assessments of their strengths and weakness affect their preferred and less preferred styles for learning. When remembering phone numbers, for example, some people like to visualize the number, some like to hear the number said orally and then rehearse it, some like to store the number "in their fingers" (kinesthetically). Another dimension of learning style involves a preference to learn on one's own or to learn collaboratively. How do participants feel about this?

Resources includes a simple problem, "The Combination Lock Problem", that can be used to help people explore preferred learning styles. You might want to present it to participants and ask them to discuss the types of strategies they prefer, and why. Is their preferred style for The Combination Lock Problem also their preferred style for other problems?

You might ask the group to discuss how they might accommodate different learning styles, plus help people discover their own styles and eventually increase the number of styles that they can use to learn.

- **Assessments of Strengths and Weaknesses in Skills**

Resources includes a form to help people assess their own strengths and weaknesses in areas such as problem solving, creativity, collaboration, communication and so forth. Answers can be kept anonymous and discussed as a class exercise. People who are willing can be encouraged to discuss their responses. Ideally, everyone will accept the goal of committing to work on solving a problem in some area in which they feel they are weak. Their story of their attempt to do this throughout the course of the workshop would be an excellent candidate to be published as an addition to *Resources*.

6. Summary and What's Next

The focus of this lesson has been on the Identify component of IDEAL. In particular, the goal was to help people identify personal beliefs, attitudes and levels of skill that can affect their abilities to learn and solve problems.

Ideally, participants will begin to focus on improving in some area that they have identified as a personal weakness. If they can share this with the group, they can probably receive help from others in the group.

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Exploring Our Own Reactions to Problems

The purpose of this exercise is to help people identify potential problems with their own approaches to problem solving. What do they do when they encounter difficulty? How do they feel?

• **The Two Trains and The Bird Problem:** This is an excellent problem to ask people to solve. As they are doing so, ask them to write down the thoughts they are having as they attempt to solve it. How do they feel about these kinds of problems? How difficult is the task for them? Are they worried whether they get the problem right or not? Ask participants to write down their thoughts right after they read the problem (or perhaps after you read it to them). Ask them to write again after they have worked for about 3 minutes. After 5 minutes (maximum), ask people to hand in the problem. Right before they do, again ask them to write down their thoughts.

Here is the Two Trains Problem:

Two train stations are 50 miles apart. At 1 p.m. on Sunday a train pulls out from each of the stations, and the trains start toward one another. Just as the trains pull out from the stations a hawk flies into the air in front of the first train and flies ahead to the front of the second train. When the hawk reaches the second train, it turns around and flies toward the first train. The hawk continues in this way until the trains meet. Assume that both trains travel at a speed of 25 miles per hour and that the hawk flies at a constant speed of 100 miles per hour. How many miles will the hawk have flown when the trains meet?

Many people's thoughts while solving this problem will be very negative. Their attention is on what might go wrong rather than on the problem at hand. As a result, they spend more time worrying about negative things than they do about solving the problem.

Reactions of College Students: Bransford and Stein (1993) asked college students to write down (anonymously) their thoughts when confronted with the two train problem. Here is a quote from a student that is highly typical of the reactions we receive:

"When asked the two train problem, many thoughts went through my head (some I can't write). My first thought was "Oh great--a question puzzle". Then when I realized that it involved numbers, I felt I might as well quit there. I was thinking how everyone else probably thought it was so easy and they got it right off. I was prepared to feel like a failure. I'm sure I gave up earlier than anyone else on the problem."

The student went on to describe his reactions to a class session that explored the problem of self-fulfilling prophesies due to negative beliefs:

"I now realize that how is anyone--even an incredible math major--supposed to solve a problem when all those negative thoughts are going through their heads?"

Bransford and Stein (1993) note that they have given the two trains problem to undergraduates for the past 5 years, and the reactions are (unfortunately) very similar to the quote from the student above. The vast majority of the students somehow came to believe that because mathematics became difficult for them at some point, they did not have it in them to "do math."

Math isn't the only culprit. As students have reflected on their own experiences, they have realized that they missed many opportunities because they bailed out when things got difficult. Here's an example:

"I vividly remember the effects of these ideas and attitudes (about inferiority) from an experience in school. We were each supposed to create an invention. Immediately I developed a negative attitude. I was not an "inventor" and was therefore not going to be able to think of anything. Each time I tried to work on the project, my attention focused on my fear of inferiority, impeding my progress. Instead of positively seeing this as an opportunity, I took on the attitude that my work in this "non-routine" (for me) field was impossible."

What About People Who Find the Two Trains Problem Easy?

Some people love tackling problems like the Two Trains problems--usually because they are good at them. Chances are, however, that there are other types of problems that they try to avoid.

Try to get everyone to think of instances where they realize they "bailed out" of a situation because they wanted to avoid looking foolish. How often do such attitudes hinder our abilities to learn?

A good example of such a situation is the **Sports/Dance Example** discussed by Bransford and Stein (1993). This represents an actual case of a person who was good in math and sports and felt pretty confident in his ability to tackle tough problems. Then he encountered a "learning to dance" problem and found himself experiencing difficulty. He started to leave but was stopped by people who offered to helped. In the end, he learned a valuable lesson about himself. Since no one can do everything, all of us encounter things that initially are difficult. How we react is the true test of whether we ultimately will learn.

A Radio Play Case Involving the Identification of Problems with Oneself : The Good Guest

The radio play Case "The Good Guest" (see the *Cases* section of *Resources*) is excellent for illustrating the importance of identifying problems with ourselves that represent opportunities for improvement. In this case, Inspector March comes to realize that he is the cause of many problems that he sees. Rather than try to deny them or to run away from the situation, March handles it with courage.

Ask participants to discuss what they think of March. Is he viewed as horrible for having created the problems? Is he looked on as weak for having acknowledged that the problems exist? Our interpretation is that March comes off as strong and successful and represents a good model for all of us.

Some Beliefs That Affect Learning and Problem Solving

Researchers have found that beliefs about ideas such as "what it means to be intelligent", or "what it means to be a successful expert" can have important effects on people's learning and problem solving .

The essays below contain information relevant to these beliefs. You can present this information to participants yourself. Alternatively, you can have them divide into groups, where each group is given the responsibility to learn about one of the concepts, present it to the rest of the group, and discuss its relevance to problem solving.

The information in this section also includes a demonstration experiment on "expertise and memory" that is very powerful. It helps people understanding how the knowledge they currently possess makes tasks such as remembering either easy or difficult.

Klutziness and Courage Spans

Effective learners are not afraid of looking like klutzes. They realize that klutziness is a stage that everyone has to go through when learning something truly new. They are able to laugh at their own klutziness rather than become defensive and quit. People who fall into the expert trap are more concerned with looking good than learning. They avoid klutziness at all costs.

What is a klutz? This word came from the Yiddish *klots* and meant literally lump or block.. It's common present-day usage means one who is clumsy in the performance of a specific task--frequently a physical task. It is a characteristic that amuses us in others, and frequently humiliates us in ourselves.

Everyone must go through a stage of being klutzy when learning something new. The reason is that all of us have a limit on how much information we can attend to at any one time. Whenever our attention is so overloaded that we cannot do everything at once, klutziness is the result. You can get a sense of attentional overload by remembering what it was like to first learn to drive a car and attempt to carry on a conversation at the same time. Chances are you couldn't do it. You had to focus all your attention on driving.

Remember what it was like? For me it was a klutzy experience. I had to explicitly attend to every aspect of driving such as hitting the brake, turning on the turn signal, turning the wheel, looking in the rear view mirror and so forth. Since I learned on a stick shift, I also had to explicitly attend to when to shift and, of course, when to depress the clutch.

With practice, the elements of driving become automatic and require much less conscious attention. This frees up our attention to do other things such as carry on a conversation at the same time.

There are many additional examples of klutziness. When you first learn to read, it takes so much conscious attention to sound out every word that it is difficult to focus on the meaning of what you are reading. When you first learn to type, you have to concentrate so much on your fingers that it is hard to think of something to write at the same time. When you first learn to solve new types of mathematical problems, chances are you struggle until the nature of the problems and operations become familiar to you. The same thing goes for a new piece of computer software. Klutziness is as normal as breathing.

Interpretations of Klutziness

What's important is how you interpret your own klutziness. When it comes to driving a car, this isn't too problematic. We all assume that everyone is eventually capable of learning to drive, it just may take some people longer than others. So most of us keep trying because driving is important, and because of our belief that we'll eventually get there.

Klutziness in other areas is often interpreted differently. If you are feeling klutzy while trying to learn about a new area in mathematics, for example, it is easy to assume that you are "not mathematical" or "not intelligent" and hence will never get there. Rather than take the risk of looking kultzy, you give up.

An outstanding researcher, Carol Dweck, has conducted an important series of studies about people's approaches to difficult tasks where they initially feel klutzy. Some people are motivated by difficulty and see learning as a challenge. Other people feel defeated and, not wanting to look bad, try to get out of the situation as quickly as possible. This behavior often produces self-fulfilling prophecies. For example, if you believe you are having trouble in math because you are not good at it, and you therefore avoid math whenever possible, you are sure to end up being poor in math.

Courage Spans

Michael Wertime discusses the importance of helping people increase their **courage spans.** How much courage do you have to deal with the role of klutz while you are developing expertise in a new domain? The intelligent novice consciously attempts to increase his or her courage span.

If something is easy for you it doesn't take courage to stick with it. But when things are difficult, differences in courage spans come into play.

I've met many people who have breezed through high school without any problems and then hit a wall in college with respect to some area (it might be math, social relationships, athletics, whatever). Only some of them have the courage and skills to deal with hitting the wall.

I've also met a number of people who have struggled though college and graduate school, taking longer to learn than most of their peers. Some have wrestled with statistics, for example; others have had great difficulty learning to write and communicate their ideas. But they have stuck with it, and when they have finally gotten through their klutziness they have been first rate! There is also a bonus to their struggle: most develop insights that allow them to be especially good at helping others deal with their own klutziness.

When you experience klutziness in yourself, vow to increase your courage span in that area. When you see klutziness in others, appreciate the courage it takes to stick with something that is initially difficult, and do whatever you can to help them view themselves as intelligent novices who attempt to increase their courage spans.

Understanding Expertise

In one of my college classes I asked students to write a paper describing their own strengths and weaknesses, and to relate their analysis to assumptions about their own intelligence .. All the papers were highly interesting, but one especially caught my eye.

The paper that caught my eye stated that the author was learning disabled and barely made it into college. One of her chief difficulties was that she could not write. But as I looked at her paper, I realized that it was written better than any other in my class. What was going on?

I had two hypotheses about the student's paper and hoped that the first one was wrong. The first hypothesis was that the student had access to a tutor who perhaps went overboard in helping her write the paper or , worse yet, wrote it for her.

I was betting on my second hypothesis, which involved assumptions about expertise. My second hypothesis was that the author was so familiar with her own life experiences that it was easy for her to write about them.

After grading and handing back the papers, I asked the student to explain why she had described herself as such a poor writer yet wrote the best paper in the class. She explained: "I've been living with my problems all my life and know them backwards and forwards. So it's easy to write about myself. But wait till I have to write about a less familiar topic. Then you'll see that I can't write well at all."

The student was right about her writing abilities. She did indeed have trouble when attempting to write about topics that were relatively new to her. But she was an expert when writing about herself. At some level, everyone is like this.

When I was an undergraduate student I frequency made presentations to different groups about my high school experiences in Asia . I became viewed as a very good speaker and felt good about this fact. When I entered graduate school I suddenly found myself floundering when attempting to give class presentations. I couldn't understand why I had lost my speaking ability. Actually, I floundered because I was trying to present ideas that were very new to me. The ability to speak clearly requires that you know what you are talking about.

Studies of Expertise

Within the past 30 years, researchers in cognitive science have begun to study how expertise in various areas (e.g.,expertise about ourselves, about some area of specialization) affects performance. A variety of experts have been studied--chess experts, physics experts, bridge experts, memory experts and so forth. The results of the studies are very important for understanding other people and understanding ourselves.

A classic study of expertise was conducted by deGroot in 1965. He asked why chess masters were better at chess than were skilled yet less accomplished players. One of deGroot's initial hypotheses was that masters could think of more possible moves than could novices; deGroot also believed that masters could think further ahead than others and hence could calculate the strengths and weaknesses of various moves.

deGroot explored these hypotheses by presenting masters and less experienced players with examples from chess games and asking them to choose the next move. He also asked the participants to think aloud as they attempted to make their choices. Contrary to initial expectations, the masters did not think of a greater number of moves than did the less experienced players, nor did the masters think further ahead (i.e., choose a move and then consider its implications for the next 10 or so moves). Instead, the masters' initial choices of moves simply seemed to be qualitatively superior to those of the less experienced players.

These results suggested a second hypothesis to deGroot. Because of their experiences, chess masters may have developed a knowledge base that allows them to perceive the significance of various game positions and hence to generate qualitatively superior moves. As one test of this knowledge-base hypothesis, deGroot presented masters and less experienced players with a view of a chess game for only five seconds and then asked them to reproduce the game (using new pieces and a new board) as accurately as they could. Results indicated that the chess masters were excellent at this short-term memory task, whereas less experienced players had considerable difficulty.

Subsequent studies by Bill Chase and Herb Simon demonstrated that the masters' superior performance was not due to a superior short-term memory capacity. When supplied with chess pieces on a board that were placed at random, the chess masters were no better than others at remembering which piece went where. When the chess pieces were placed at random, the masters' knowledge base did not help them encode randomly placed pieces. When the chess configurations were meaningful, however, the experts were better able to perceive relevant patterns than were the less experienced players . Therefore, their abilities to remember were enhanced.

Miki Chi extended the research on memory for chess positions by comparing the performance of young students (approximately 10 years of age) who played a lot of chess with the performance of college students who did not play chess. Chi used two different types of materials in her memory tests.

The first type of memory test involved strings of numbers such as 83940284. People heard number strings read to them and then tried to repeat them back. Under these conditions, the college students outperformed the younger students.

The second type of test Chi used was the one studied by deGroot and Chase and Simon. It involved memory for chess positions after viewing a chess game for only 5 seconds. For this test, the young chess experts outperformed the college students. Expertise in chess helped the students see patterns that were meaningful to them.

Studies comparing experts and less experienced individuals have also been made in areas such as engineering, computer programming, social science,reading comprehension, physics, medical diagnosis, and mathematics . In each of these studies, the expert knowledge available to individuals has allowed them to perform feats that look "extraordinary"--feats such as the ability to remember a great deal of information or solve problems that leave novices in awe. You can do the same sort of thing when information matches your level of expertise.

General Lessons About Expertise

One of the most important lessons from the study of expertise is that the availability of well-organized knowledge makes all kinds of processes easier. It is easier to remember information relevant to your area of expertise and easier to write about information relevant to your area of expertise. It is even easier to interpret information if it is related to an area you know about ---try listening to conversations about familiar vs. unfamiliar topics over a squacky walky-talky or CB radio and you'll see what I mean. A major reason for the benefits of expertise is that information is less likely to overwhelm our attentional capacity. This is discussed more fully in *K is for Klutziness.*

Probably the most important lesson from the study of expertise is: Don't undersell your own abilities simply because someone else seems to display "superhuman" abilities" If you analyze the reasons for peoples' abilities, chances are you'll discover that many are due to the fact that they have had the opportunity to acquire a great deal of relevant knowledge. For example, consider the brilliance of surgeons. They undoubtedly have demonstrated an ability to learn, but their abilities are still limited by their experiences. If you don't believe this, ask yourself whether you would call a surgeon or a plumber to fix a plumbing problem in your house.

It's easy for people to observe the ease with which experts perform tasks and then question their own abilities. For example, college students will often come to my office to discuss problems such as how to organize a paper about an issue that we had discussed in my course. Usually I can give then some suggestions pretty quickly. Sometimes this has unfortunate effects. Many have said something like "I've been thinking about this for days and you came up with these ideas in minutes. I always knew I didn't have the talent to write."

I try to help the students see the reality behind the situation. Although I hate to admit it to myself, I explain that I've specialized in thinking and writing about issues similar to the topic they asked about for 20 years of my professional life---longer than many of them have been alive.

One of the clearest findings from the study of experts in different areas is the amount of time that expert devote to their craft. Chase and Simon estimate that to be a competitive international chess master requires a minimum of 50,000 hours. I know some chess players who are extremely good but still well below the level of international master. They estimate that they have worked on their game for about 10,000 hours. That's about the amount of a time that college students would spend on their studies if they worked 8 hours a day, 300 days a year for 4 years. It's very important for people to understand how long it takes to develop expertise. One of the reasons is that experts have to learn when, why and how to use just those aspects of their knowledge that are relevant at the moment.

Concluding Thoughts

An understanding of expertise is extremely important for lifelong learning. Our processing capacities, our memories, our abilities to write and speak clearly, are all affected strongly by the degree to which we have developed expertise in certain areas. When we have not developed expertise, we inevitably seem klutzy . When we have developed expertise, we are able to do a number of things almost effortlessly.

It's easy to underestimate our own abilities when we are novices in an area and compare ourselves to experts. They often look superhuman. But
in areas where they are novices,they look like us.

From Expert to Accomplished Novice: Achieving New Levels of Personal and Professional Success

It is easy to believe that the ultimate in success is to become "the expert "who is in charge and knows all the answers. From the "top gun" pilot, to the "top dog" athlete or performer, to the "top notch" teacher, physician, business leader, politician or scientist, we look up to people who seem to be masters of their respective universes. They are fast acting, quick witted, always sure of themselves. We look to them for action, answers and leadership .They fill our news and TV talk shows; they provide models that we try to emulate.

A need to always be the expert-in -charge results in the "expert trap" -- a trap that can have a crippling effect on peoples' abilities to learn and to work effectively with others. Individuals who fall into the expert trap fail to reach a new level that I call "the accomplished novice". Accomplished novices have transcended the need to always be the expert. They realize that what they know is minuscule in relation to all that is potentially knowable, hence they eagerly seek new ideas and suggestions. They have the confidence to listen and learn from others and to acknowledge their contributions. They are able to work with others to collaborate.

The purpose of this chapter is to discuss the expert trap and the value of transcending it in order to become an accomplished novice. It is also emphasized that achieving and maintaining the attitude of the accomplished novice is very difficult. Societal pressures constantly push all of us to play the role of "know -it -all experts", and this counteracts efforts to continually learn and collaborate. As a society, we need a new model of what it means to be a personal and professional success.

TOWARD A NEW MODEL OF SUCCESS: My thesis is that lifelong learning can be enhanced by efforts to explicitly define a new model of what it means to be "accomplished" or "successful". The need for new models of success has emerged from my work as a cognitive scientist who specializes in learning theory . During the past 20 years, I've had the privilege of studying how differences in learning make some people more successful than others. In the process, I've met hundreds of people who were considered experts in their respective fields, including scientists, mathematicians, teachers, artists, business executives, athletes, religious leaders and politicians. All have accumulated marvelous sets of credentials. Many have generated long lists of products such as books, articles and works of art; others have won awards for being outstanding teachers, business leaders, religious leaders, athletes and politicians. All of them seem to have it made.

I have also noticed something else about highly successful individuals. Many of them seem comfortable only when they can play the role of "the expert who knows all the answers". They are much better at telling people what to think and do than they are at listening to new ideas suggested by others. They view themselves as "the boss" whose major role is to be in charge. You don't work with them, you work for them. In my experience, these types of people are not much fun to be around. They inhibit me from being creative and doing my best work. Their vision of what it means to be successful is consistent with Figure 1. For them, reaching the level of expert is the ultimate in success.

Figure 1.

A Typical Model of Levels of Success

Expert
Advanced
Intermediate
Novice

Only some of the successful people I have met demonstrate a need to always be the expert-in-charge. Many exhibit a very different attitude. They are proud of the years of hard work necessary to qualify them as experts in some area. Nevertheless, they also realize that their areas of expertise look extremely small when compared to all that is knowable. For most of life, they see themselves as accomplished novices who need to learn rather than as experts who know it all. Their vision of being accomplished novices is illustrated in Figure 2. For them, becoming an accomplished novice is the ultimate sign of success.

Figure 2

A New Model of Levels of Success

Accomplished novice
Expert
Advanced
Intermediate
Novice

Accomplished novices realize that there are several things wrong with the "expertise - is - the - ultimate" model.

First, the model of experts as "knowing it all" totally ignores the processes necessary to become experts in the first place. If you want to become an expert you have to learn, and to learn effectively you need the courage to risk making mistakes. If your mental model of success is to "always be right", you will miss many opportunities to learn.

Second, the expertise that any one person has acquired is extremely limited when compared to all that is potentially knowable. Therefore, for most areas of life, we are all novices rather than experts.

Third, because of increasingly rapid changes in society, the "expert as know-it-all" model ignores the fact that true experts must be lifelong learners who continue to seek new information. If they don't, today's experts quickly become tomorrow's "also ran".

Fourth, probably the most dangerous aspect of the "all-knowing expert" model is that it hampers our abilities to collaborate with other people. The expert is used to being the boss who "has all the knowledge" and tells everyone else what to do. This is very different from working collaboratively with people, attempting to learn from them, and supporting them in making decisions of their own.

The image of being an accomplished novice is liberating. Instead of needing to control everything and knowing all the answers, accomplished novices are able to entertain new ideas from others and to acknowledge others for teaching them something new. In my experience, accomplished novices are wonderful to work with. They demonstrate a love for learning that is contagious. They look at the strengths of people's suggestions rather than always look for reasons to reject them. They instill confidence in those around them because they admit mistakes and confusions in their own thinking and, in the process, provide a safe environment for brainstorming and discussion. They are excellent collaborators who help others do their best.

TEACHING AND THE EXPERT TRAP:. As a college professor, I am well aware of the pressures to be seen as the expert who is in charge and knows all the answers. Teachers from kindergarten through college feel these pressures every day. It can be embarrassing for students to ask a question and a teacher to have to say "I don't know".

As a college professor, I know that one way to maintain the image of "the expert" is to tightly control the curriculum so that it covers only the content that I know completely. I can also lecture a great deal and leave almost no time for students to ask questions; this reduces the danger that students may ask something that the I do not know. All these strategies help me look like an expert, but they don't necessarily help my students learn.

Ideally, both teachers and students would realize that information is expanding so rapidly that it is impossible for any single individual to know everything about his or her subject matter. Therefore, teachers would be viewed as individuals who learn along with their students and, in the process, model how to ask important questions and use effective learning strategies. But until current expectations are changed, there is pressure on teachers that move them toward the expert trap.

BUSINESS AND THE EXPERT TRAP : The image of the boss who knows all the answers and simply tells everyone else what to do illustrates the expert trap in the area of business. This "top down", hierarchical model of organization is being questioned more and more as businesses are forced to adapt to rapidly changing conditions in the world . Ethel Romm, President and Chief Executive Officer of the Niton Corporation, comments on problems with hierarchical organizations run by bullying type managers who think they have to order people around in order to get things done. She states:

> "...they are misled into believing that their meanness or callousness is keeping everyone in line. Then can easily get the idea that if they don't command, control and coerce, the place will fall apart. The feedback is all wrong." (p. 15)

Many businesses are moving away from the idea of strict hierarchical management and toward the idea of work teams where everyone contributes to policy and problem solving. But this means that bosses must be willing to acknowledge the contributions of others rather than simply give the orders. If bosses fall into the expert trap, they counteract the efforts of effective teams.

EXAMPLES OF ACCOMPLISHED NOVICES

As a graduate student, I experienced an event that planted the seed for appreciating the value of viewing oneself as an accomplished novice. I and several hundred others were attending a symposium at a national research conference that featured four nationally known speakers. The fourth speaker presented data relevant to the topic of human memory. At the end of his presentation he noted that his data contradicted a claim about recognition memory that had been published by the first speaker a year earlier. As he made that statement, he looked directly at the first speaker, and so did the hundreds of us who were watching the symposium unfold.

The moderator said, "It is now time for questions from our audience. However, I feel that Dr. A (the first speaker) should first be given an opportunity to respond to Dr. D. (the fourth speaker).

The first speaker got up from the table and walked slowly toward the microphone in the suddenly silent room. With a very serious look on his face he said, "About my disputed claim that recognition memory does not involve retrieval processes (pause). . . . "Can I take it back?"

Everyone in the room broke into applause. Like me, they realized that they had just witnessed a stunning display of scientific openness and integrity. The first speaker's goal was not to defend his original theory of human memory at all costs. Rather, he wanted to discover truths about human memory by looking carefully at experimental data. And the fourth speaker's data had convinced him that his theory was in error.

Examples of transcending the expert trap appear in every walk of life. One of my favorite examples involves a middle school teacher whom I have had the pleasure of knowing for the past 10 years. Several years ago he volunteered to be a pioneer teacher for an international project called "Schools for Thought". The project involved new approaches to the design of curriculum, instruction and assessment and was very difficult to implement. Jeff did an absolutely outstanding job his very first year. After that, everyone relied on him to help teachers who were new to the project learn what to do.

Jeff could easily have rested on his laurels as the "Schools for Thought expert" and simply adopted the role of teaching everyone else what he knew. But he avoided the expert trap; he continually wanted to learn from others so that all of them could improve.

In the second year of the Schools for Thought project, Jeff team taught with another person who was an excellent teacher but a novice with respect to Schools for Thought. I vividly remember Jeff's comments when I asked how things were going with his new partner. And I also couldn't help but notice what he didn't say.

He didn't focus on his role as the expert and say : "I've taught her this and this and have been very pleased with the effectiveness of my teaching methods"

He didn't focus on what his partner needed to know and say "She's done a great job of learning what I have taught".

What Jeff did say if as follows: "She's teaching me so many new things I'm especially pleased that all the students are going to be better writers than they were last year because she's a great writing teacher. It's exciting to work with her."

I know for a fact that Jeff did a wonderful job of helping his partner learn a host of things relevant to the Schools for Thought project. But when I asked him how things were going, his emphasis was on what he and his students were learning from his partner rather than on what he had taught.

Note the risk involved in Jeff's comments. He was supposed to be the Schools for Thought expert and his partner was the novice. Under those circumstances, one expects the expert to teach the novice what to do. But Jeff didn't dwell on the "novicehood" of his new partner; instead, he focused on the strengths that she brought to the collaboration. If you are the supposed to be the expert in a situation, doesn't it seem like a weakness to focus on what others taught you rather than what you taught them?

Time and time again I have found that the acknowledgment of strengths in others is viewed positively rather than negatively. People mired in the expert trap believe that they need to "put others in their place" in order to maintain their status as experts. In contrast, accomplished novices believe that their greatest strength comes from their ability to help others succeed. I believe that most people admire the attitude of the accomplished novice when they see it in others. Nevertheless, the tendency of all of us is to believe that we have to play the role of the expert in order to be perceived as a success.

GENERAL CHARACTERISTICS OF ACCOMPLISHED NOVICES

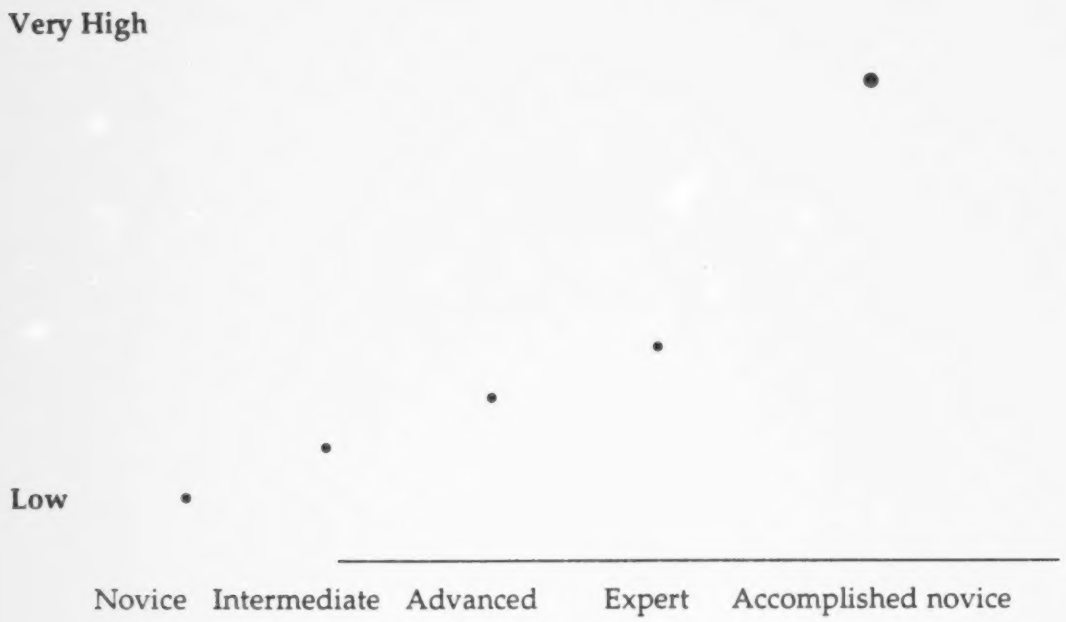
Overall, Accomplished novices exhibit the following characteristics:

- **Humility** about their expertise relative to all that is knowable
- **Courage** to venture out of their areas of expertise and try new things where they might make mistakes
- **Personal strength** to seek feedback about their performance and acknowledge the contributions of others
- **Commitment** to help others learn and grow rather than only help themselves.

Based on my experiences, people who reach the level of Accomplished novice have a much greater positive impact on their communities and the growth of those around them than do people who stop at the level of expert. An illustration of this impact is shown in Figure 3.

Figure 3

Degree of Positive Impact on Knowledge and Other People



A Demonstration of the Effects of Expertise

You can experience the effects of your own expertise on performance by completing the following demonstration experiment. You'll be asked to read a simple set of sentences. Please read each one relatively quickly (it should take no longer than 3 seconds per sentence), and please do not use any fancy memory strategies such as repeating the sentences in your mind a number of times or trying to link the sentences together by making them into a story. Simply read each sentence and go on to the next. Begin now.

John walked on the roof.
Bill picked up the egg.
Pete hid the axe.
Jim flew the kite.
Frank flipped the switch.
Alfred built a boat.
Sam hit his head on the ceiling.
Adam quit his job.
Jay fixed the sail.
Ted wrote the play.

Now try to answer the following questions without looking back at the preceding sentences. Keep track of your answers. If you're not sure of an answer, just go on to the next question.

Who built the boat?
Who picked up the egg?
Who walked on the roof?
Who quit his job?
Who flew the kite
Who fixed the sail?
Who hit his head on the ceiling?
Who wrote the play?
Who flipped the switch?
Who hid the axe?

Analysis of Your Performance: Did you have a difficult time remembering who did what? Most people do. If you followed the directions and read the sentences without using fancy memory strategies, you could probably remember only two or three at the most. To remember more of the sentences you would have had to use "effortful" elaboration strategies, such as thinking of someone you know with a particular name (for example, a friend named John) and imagining him walking on the roof.

Part II of the Demonstration Experiment

In the next part of the demonstration experiment you will receive a new set of 10 sentences.. As in the earlier task, *do not attempt to use sophisticated memory strategies.* Instead, simply take about 3 seconds to read each sentence and go on to the next.

Santa Claus walked on the roof.
The Easter bunny picked up the egg.
George Washington hid the axe.
Benjamin Franklin flew the kite.
Thomas Edison flipped the switch.
Noah built a boat.
Wilt Chamberlain hit his head on the ceiling.
Richard Nixon quit his job.
Christopher Columbus fixed the sail.
William Shakespeare wrote the play.
Now answer the following questions without looking back at the list.
Who built the boat?
Who picked up the egg?
Who walked on the roof?
Who quit his job?
Who flew the kite?
Who fixed the sail?
Who hit his head on the ceiling?
Who wrote the play?
Who flipped the switch?
Who hid the axe?

Analysis of Your Performance: Were you more successful remembering this second set of sentences than the first set? I bet you were. The second set is designed to be congruent with the kinds of knowledge and experiences that are probably familiar to you. Because of your knowledge, you could elaborate on each sentence almost effortlessly. Thus, even though you may never have been told explicitly that "George Washington hid the axe", you know about George Washington and the cherry tree. So you probably made the inference that the axe being referred to was the one he used to chop down the cherry tree, and this made it easy to remember that it was George who hid the axe. But you were able to make these inferences almost effortlessly---much like the chess masters who easily remembered meaningful chess positions that they were shown.

Identifying Personal Strengths and Weaknesses

Effective problem solvers are able and willing to identify particular strengths and weaknesses that they have in learning and solving problem.

• **Assessments of Strong vs. Weak Learning Styles :** Some of peoples' assessments of their strengths and weakness affect their preferred and less preferred styles for learning. When remembering phone numbers, for example, some people like to visualize the number, some like to hear the number said orally and then rehearse it, some like to store the number "in their fingers" (kinesthetically). Another dimension of learning style involves a preference to learn on one's own or to learn collaboratively. How do participants feel about this?

Example Problem: Remembering a combination to a lock

The following problem can be used to discuss varieties of possible solution strategies and preferred learning styles.

Jason got a new combination lock for his gym locker. The combination was 9 - 12 - 53. Jason was worried that he would lock his locker and then be unable to remember it when he came back from gym class. What are some strategies for solving the problem he faced.? Which would you personally prefer?

(Ask participants to generate as many as they can and be prepared to discuss the ones they prefer and why. Then you can get people to share, and you can add additional examples such as the ones noted below.

1. Individual strategies

(i) rehearse the combination a number of times

(ii) use an "expanding retrieval" strategy (e.g. Jason first rehearsed the combination; then he thought about some concepts in his biology class for a short amount of time before re-rehearsing the combination; then he thought about concepts in biology class for a longer amount of time before re-rehearsing the combination, and so on. In short, Jason gradually "expanded" the interval over which he had to remember the combination .

(iii) use meaningful elaboration strategies (e.g. Jason knew that his mother's birthday was in the 9th month, he was 12 years old, and his Dad was born in 1953.)

(iv) use an imagery strategy (e.g. Jason imagined a clock with a little mouse going to 9, then 12, and then 4 and 3 whereit ate some cheese.

(v) use a "kinesthetic memory" strategy by actually moving the lock through its location a number of times until the memory is "in the fingers".

2. Collaborative Strategies

(i) ask the Gym teacher to write down the number to his new combination in case he forgot.

(ii) ask three different friends to each remember one of the numbers (i.e., 9 -- 12-- 53)

(iii) write the combination on a piece of paper and placed it in his gym shoe.

3. More general strategies:

(i) eliminate the need for remembering combinations to locks by inventing the "voice activated" padlock (The lock can be "trained" to open only when it hears the owner's voice).

(ii) eliminate the need for locks by inventing an "honesty serum"that makes it unnecessary to ever lock anything again.

(iii) keep people away from your locker without using a lock by posting a "Danger,Do Not Open, Health Hazard" sign on the locker door.

You might ask the group to discuss how they might accommodate different learning styles, plus help people discover their own styles and eventually increase the number of styles that they can use to learn.

Placeholder for additional exercises.

SKILL ASSESSMENT INVENTORY EXERCISE

Why

The assessment inventory helps participants identify their own strengths and weaknesses. The assessment information will be used again in this lesson (as part of the skill hunt exercise).

Another assessment inventory will explore how individuals feel that their company rates the importance of themselves, their job, and their ideas.

Who

This activity is suitable for all groups

Time Required

This exercise should take from 5-15 minutes.

Supplies Required

Pens or Pencils
Copies of the Skill Inventories worksheets for each participant

SKILL ASSESSMENT INVENTORY
Directions

How

Worksheet 1. Hand out copies of the Assessment Inventory Worksheet 1. Announce to the group.

"We would like you to evaluate your own skills in the areas below. Think about your skills in terms of strengths and weaknesses when you fill in the worksheet."

Worksheet 2. Hand out copies of the Assessment Inventory Worksheet 2. Announce to the group.

"We would like you to evaluate the importance your company places on each of the items in this list."

Additional Directions

For participants with English reading levels below sixth grade

1. If your group consists of people with mixed abilities but at least half can read English at the sixth grade level, you can have the students work in pairs. Each pair should consist of one person who has difficulty reading the information and one person who does not. They should then work together to complete the inventory.

2. If your group consists of predominantly individuals who read English below the fifth grade level, you may want to make an overhead of the inventory. As you read each item and possible responses, show the locations on the form and give the participants time to mark their answers.

SKILL ASSESSMENT INVENTORY
Worksheet 1

Rate your own skills in the areas below

Skill Area	Very Good	Good	Average	Poor	Very Poor
Memory					
Problem Solving					
Public speaking					
Group cooperation					
Reading					
Math					
Writing					
Creativity					
Studying					
Finding information					
Time management					

SKILL ASSESSMENT INVENTORY

Worksheet 2

Rate the importance of each item below by your company

Skill Area	Very Important	Important	Somewhat important	Unimportant	Very Unimportant
Your Job					
Yourself					
New Ideas					
Not Making Mistakes					

SKILL HUNT EXERCISES

Why

The skill hunt is an effective tool to help the workshop participants get to know each other. This is important because the workshop will emphasize cooperative learning and problem solving. Both of the versions described below use information gathered from the skill assessment inventory given at the beginning of the lesson.

Version 1 of the skill hunt helps the participants locate others who have specific skills that will be needed in the future. This information will be especially useful when they begin working on group projects or if they need tutoring in a specific area. In version 1, individuals will meet a large number of participants.

Version 2 of the skill hunt helps the participants locate someone who has specific skills that could serve as a tutor and get to know them in more depth. It also helps them identify someone else with similar needs so that they could form a study group. Participants also get to explore some of the reasons people experience success or failure in an area.

Who

This activity is suitable for groups with five or more participants

Time Required

This exercise should take from 10-30 minutes. (Depending on how much socializing you allow.)

Supplies Required

Pens or Pencils
Copies of Skill Hunt worksheets for each participant
The Skill Inventories completed at the beginning of the lesson

Skill Hunt Directions

How

Choose version 1 or version 2 of the skill hunt. Hand out copies of the appropriate skill hunt worksheet. Also, each individual will need a pencil or a pen. Announce to the group.

Version 1 "We are now going to spend the next ____ minutes getting to know each other. Please obtain the names of people in the room for each question. You should write the name of the individuals on your own sheet so that you will remember them."

Version 2 For this version you will need a list of skills that you feel your group wishes to improve. If you do not have specific skills in mind, we suggest that you use the skills listed in Assessment Inventory 1. "We are now going to spend the next ____ minutes getting to know each other. After you complete the first question, please obtain information from two other people to complete the second and third sections. You should write the information about the individuals on your own sheet so that you will remember it."

Additional Directions

For larger groups. You should obtain each person's name only once. Do not sign your own form."

For participants with English reading levels below sixth grade

1. If your group consists of people with mixed abilities but at least half can read English at the sixth grade level, you can have the students work in pairs. Each pair should consist of one person who has difficulty reading the information and one person who does not. They should then work together to find the information.

2. If your group consists of predominantly individuals who read English below the fifth grade level, you may want to read each question and then give the participants time to locate that individual, read the second question and then give the participants time to locate that individual.

SKILL HUNT WORKSHEET
(VERSION 1)

1. Someone who likes to speak in public ______________________.
2. Someone who likes math ______________________.
3. Someone who likes to write ______________________.
4. Someone who likes to solve problems ______________________.
5. Someone who likes to be creative ______________________.
6. Someone who has a good memory ______________________.
7. Someone who is good at managing their time ______________________.
8. Someone who reads well ______________________.
9. Someone who is good at finding new information ______________________.
10. Someone who is good at using computers ______________________.
11. Someone who is good at working in teams______________________.

SKILL HUNT WORKSHEET
(VERSION 2)

I. Everyone has strengths and weaknesses. List your weakest area from the list provided by your trainer____________________.

II. Find someone who is good at your weakest area.

1. Name __________________________________.

2. What experiences did they have that led to success in this area

____

____

3. Have them describe their most positive educational experience.

____

____

4. What are their hobbies?

____

5 . What is the most important thing that they would like to get out of this workshop?

____

III. Find someone else who wants to work on the same skill as you.

1. Name __________________________________.

2. What experiences did they have that caused them to have problems in this skill area?

____

____

C. Have them describe their most positive educational experience.

____

____

D. What are their hobbies?

____

E . What is the most important thing that they would like to get out of this workshop?

____

Skills For Skill Hunt
Version 2

Memory

Problem Solving

Public Speaking

Group Cooperation

Reading

Math

Writing

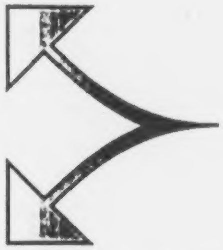
Creativity

Studying

Finding Information

Time Management

Module 4



ENHANCING CREATIVITY

Defining Alternative Goals

The purpose of this module is to further enhance creative thinking by first helping participants identify beliefs about creativity that can hamper or promote it. The major focus is on developing an understanding of problems and explicitly **Defining** alternate goals.

Many people have erroneous ideas about creativity (it's innate, it's only relevant for areas like art, music, dance) that make them believe they are not creative. It is important to explain that these ideas are wrong.

Most people take less-than-creative approaches to problem solving, in part, because they skip the **D** step in IDEAL. Instead, they go straight from hearing about a problem (I) to exploring strategies E. A major goal of this lesson is to help people realize that they do tend to skip D and that explicitly focusing on D can be very useful. It helps people to be more creative by generating ideas for problem solving that are both novel and appropriate.

Goals

- Defining goals
- Enhancing creativity
- Understanding Problems
- Group learning & cooperation
- Listening Skills
- Public Speaking

Exercise & Resource Options for Module 4

Resource#	Name	Purpose
D1	Beliefs & Creativity	Expose erroneous beliefs
D2	Define Goals Exercises	Show effects on creativity
D3	Radio Play: Mooney Medical	Different goals result in different views of the problem
D4	Radio Play: Fear Strikes Out	Illustrate effects of organizational structure on creativity
D5	Defining Goals for Real World Problems	Apply IDEAL to their world
D6	Assessment	Evaluate progress

Module 4: Enhancing Creativity:
Working on the D in IDEAL

1. Summary of Last Lesson and Overview of This One

Last time we focused on the task of identifying beliefs about the nature of our learning and intelligence that can either help or hamper problem solving and learning. By identifying these beliefs, we increase our abilities to learn and solve problems. Learning to identify problems rather than ignore them helps us respond more creatively to problems that arise.

The purpose of this lesson is to further enhance creative thinking by helping participants (a) identify beliefs about creativity that can hamper or promote it; and (b) developing an understanding of problems and explicitly defining alternate goals.

2. Beliefs about Creativity

We noted in Lesson III that people's problem solving can be hampered or hindered depending on their beliefs about certain competencies. For example, a belief that "experts never make errors" or "intelligent people always know the answers" can be very harmful. Beliefs such as these get in the way of people's abilities to learn.

The focus of this lesson is on creativity. People's beliefs about this topic can also be helpful or harmful. It is important to help participants realize that many popular beliefs about creativity are wong.

First, many people believe that creativity is something associated solely with art or music. If they are not versed in these areas, they may believe that they are not creative.

It is important to help people realize that to be creative is to come up with problem solving strategies that are "novel and appropriate".There are creative and non-creative cab drivers, carpenters, scientists, artists, dancers and so forth. Creativity is important to shoot for irrespective of what you do.

Second, many people believe that creativity is simply "being strange". Some people think of themselves as creative and always attempt to do things in a novel way (e.g. they may dress strange, talk strange, pride themselves on their messy desks, etc.). However, remember that true creativity involves being both novel and appropriate. Self-discipline and relevant knowledge are very important for productive, creative acts.

Third, a common belief is that creativity is innate. That's not true. Everyone can learn to dramatically increase their creativity--their ability to generate ideas that are novel and appropriate.

The major goal of this lesson is to show you how. Then you'll need to practice on your own (and remember to adopt a healthy courage span)

Fourth but related to the third point, it is often assumed that creativity is a function of individuals. However, the social structure of organizations can do a lot to encourage or discourage creativity. (If you have already used it, you might remind participants of the radio play case "Fear Strikes Out".

We saw in the last lesson that an important part of creativity involves our willingness and ability to identify problems that represent opportunities for improvement. That's the I part of IDEAL. The D in IDEAL is also relevant to creativity. We'll focus on it shortly. First I want to present a problem for you to solve.

3. Present a Problem(s) to be Solved

- **The "Noisy Office" problem:**

Resources includes this problem. An employee in a company is having trouble working because of the squeaking door to the bathroom which is right across the hall from his office. The employee tries closing his door and eventually, oiling the hinges on the bathroom door. However, neither strategy helps. What other strategies might he try? (Have people write down their answers).

- **The Grocery Store Problem:** *Resources* includes The Grocery Store problem which you might want to use instead of, or in addition to, The Noisy Office problem. Follow the same procedure for this problem as outlined above.

4. Develop an Understanding plus Define Alternate Goals

The D in IDEAL stands for "Develop an understanding of problems and attempt to define at least two alternate goals". This is a step in problem solving that most people miss; instead, they go straight to strategy generation. Chances are that this is the approach taken by most people who solved the Noisy Office and the Grocery Line problem.

Most people probably listened to the problem(s) and almost immediately began generating strategies. Everyone will be able to suggest some strategies. Nevertheless most people will have missed thinking about some possibilities because their approach was more trial-and-error than systematic. The IDEAL approach should help them increase their creativity. .

Help participants return to the preceding problem(s) from an IDEAL perspective. In particular, get them to step back and define at least two alternate goals for problem solving. New goals suggest new solution strategies. Examples of goals are:

For the Noisy Office:

1. How do I keep the noise from occuring? (oil hinge; remove the door).
2. How do I keep the noise from entering my office? (increase the insulation on the door; put a towel under the door).
3. How do I keep the noise from bothering me? (get a white noise generator; play music while you work)
4. How to I get people to avoid using the bathroom ?(take out the soft drink and coffee machines; build another bathroom that is much more plush).

Resources contains this problem as well as similar examples for the Grocery Store Line Problem.

5. A Case that illustrates how developing an understanding of a problem can lead to alternate goals.

The Radio play "Mooney Medical" is an excellent case for illustrating how the goal of attempting to understand a problem (as opposed to the goal of attempting to solve a problem that one is sure one understands) leads to very different goals for problem solving. In this case, the head of a rural hospital wants March to solve a problem she is sure she understands: the emergency medial people need to be replaced. March develops a different understanding of the problem and ultimatly ends up with very different goals.

Her goal is essentially: How do I get rid of these worthless volunteers?

March's goal becomes: How do we harness the enthusiasm of these volunteers so that they will agree to further training?

Ask participants to think of analogous situations that come to mind for them.

6. Social Constraints on Creativity

Play (or re-play) the case "Fear Strikes Out" . Help participants identify aspects of the organizational structure of the company that seemed to stifle creativity. What are some alternatives? What about their own company?

7. Working on Participants' Own Problems

Ask participants to explore how their beliefs about creativity might affect their ability to find and solve an important personal problem. Also, have they really attempted to under the problem they have been working on, and have they attempted to explicitly define alternate goals. Ask some people to share their ideas about this.

8. Summary and Next Time

The focus was on enhancing creativity. Many people have erroneous ideas about the nature of creativity. It is important to realize that creativity refers to actions and ideas that are novel and appropriate, and that creativity can be learned.

IDEAL problem solving provides many avenues for enhancing creative thinking. Especially important are the phases of problem identification (see Lesson III), plus the attempt to develop an understanding of problems and define alternate goals rather than only one goal. When people stop the rush toward immediately generating strategies and take the time to define alternative goals, they become more creative. By explicitly defining their goals, they open up new possibilities for generating strategies.

Next time we will explore how our goals affect the processes of understanding and learning new information.

Beliefs about Creativity

People's beliefs about the nature of creativity can be helpful or harmful. It is important to help participants realize that many popular beliefs about creativity are wrong.

First, many people believe that creativity is something associated solely with art or music. If they are not versed in these areas, they may believe that they are not creative.

It is important to help people realize that to be creative is to come up with problem solving strategies that are "novel and appropriate".There are creative and non-creative cab drivers, carpenters, scientists, artists, dancers and so forth. Creativity is important to shoot for irrespective of what you do.

. Second, many people believe that creativity is simply "being strange". Some people think of themselves as creative and always attempt to do things in a novel way (e.g. they may dress strange, talk strange, pride themselves on their messy desks, etc.). However, remember that true creativity involves being both novel and appropriate. Self-discipline and relevant knowledge are very important for productive, creative acts.

Third, a common belief is that creativity is innate. That's not true. Everyone can learn to dramatically increase their creativity--their ability to generate ideas that are novel and appropriate. The major goal of this lesson is to show you how. Then you'll need to practice on your own (and remember to adopt a healthy courage span)

Fourth but related to the third point, it is often assumed that creativity is a function of individuals. However, the social structure of organizations can do a lot to encourage or discourage creativity. (If you have already used it, you might remind participants of the radio play case "Fear Strikes Out".

We saw in the last lesson that an important part of creativity involves our willingness and ability to identify problems that represent opportunities for improvement. That's the I part of IDEAL. The D in IDEAL is also relevant to creativity. We'll focus on it shortly. First I want to present a problem for you to solve.

The "Noisy Office" Problem

An employee in a company is having trouble working because of the squeaking door to the bathroom which is right across the hall from his office. The employee tries closing his door and eventually, oiling the hinges on the bathroom door. However, neither strategy helps. What other strategies might he try? (Have people write down their answers).

Answer to the Problem: The D in IDEAL stands for "Develop an understanding of problems and attempt to define at least two alternate goals". This is a step in problem solving that most people miss; instead, they go straight to strategy generation. Chances are that this is the approach taken by most people who solved the Noisy Office problem.

Most people probably listened to the problem and almost immediately began generating strategies. Everyone will be able to suggest some strategies. Nevertheless most people will have missed thinking about some possibilities because their approach was more trial-and-error than systematic. The IDEAL approach should help them increase their creativity. .

Help participants explicitly define several different goals for the Noisy Office problem, and help them see that new goals open up new avenues for possible strategies.

Listed below are some possible goals and the kinds of strategies they suggest:

1. Keep the noise from happening (e.g., oil the hinge; remove the door to the bathroom; make the bathroom off limits at night)

2. Keep the noise from entering the office (e.g., put a towel under the door; find ways to insulate the room for sound).

3. Keep the noise from bothering the employee (e.g., move his office; purchase a "white noise" generator or some other means for making a constant sound that blocks out the noise from the squeaky door).

4. Keep people from needing to use the restroom (e.g., remove the soft drink machines; build another bathroom elsewhere that's a lot more plush).

A Question to Pursue: Did the group as a whole come up with the range of strategies suggested above? Did any individual do so? Did people's ideas for strategies come from their experiences, or from some thinking process that led to a new "insight"?

When people use strategies associated with routine, trial-and-error problem solving they do not systematically examine goals and relate them to strategies. As a result, their problem solving is more restricted and less creative than it could be. The IDEAL framework helps one take a much more systematic approach to problem solving. One result is that everyone thinks of a wider range of possibilities.

The Grocery Store Problem

A grocery store is losing customers because they are annoyed at how long it takes to check out. If you were hired as a consultant for the company, what would you suggest?

Typical solutions include:

- train cashiers to work faster
- purchase scanners and other technology to speed things up.
- open up "small order" lines for people who are buying only a few items.
- increase the number of checkout lines (often very hard to do)

Note that all of the above address the goal: How can I speed up the procedss of getting customers through the checkout line?

Here are some alternate goals:

1. How can I keep people from getting annoyed despite long lines? (e.g., TV's at the checkout line, some soft of entertainment, giving out free samples (which can also let the store do research on products), etc.
2. How can I keep the store from having too many customers at the same time? (e.g., offer deals to get people to come at non-peak hours).
3. How can I eliminate the need for checkout lines at all? (e.g., invent new electronic devices on items you put in your basket that automatically are charged to a debit card for the store.)
4. Other goals?

Using the D in IDEAL

Let me give a simple example of functional fixidness and how I finally got out of it. I was asked to make a presentation to a conference that focused on the goal of helping people improve their thinking skills. For part of my presentation I wanted t to show visual information, and I needed to make sure that the visuals could be seen. Since I had done this many times, I unthinkingly assumed that the best method for showing the visuals was to use transparencies and an overhead projector. However, I then discovered that the anticipated audience size was 700, so I began to worry about their ability to see the visuals. I conducted some experiments on how big I could make my overheads and how far away people could be and still see them.

In the middle of all this activity I suddenly remembed some advice that my colleague Barry Stein and I had written in our book The IDEAL Problem Solver. We explained that people often fell into the trap of "thinking as usual" and failed to ask themselves a simple question: "Can I think about this differently?. As I thought about this question I began to realized that I was constrainng my thinking by asking myself how I could make all my figures bigger. But my real goal was to make sure that everyone in the audience could clearly see my visuals. As it turned out, I eventually dramatically reduced the size of all my visuals so that they could be made into a single-page handout. This solution worked very well.

If you are thinking that the example of reducing my visuals is not the kind of thing that people normally associate with "creativity", you are right.People often mistakenly assume that only people such as artists and musicians are creative. In fact, there is creativity in every field imaginable. People can take creative approaches to plumbing, cab driving, computer programming, report writing, experimental research, showing visuals to a large audience and so forth. Conversely, people can take non-creative approaches to music and art.

Effective problem solvers realize that creativity often involves stepping back from a problem and redefining one's goals; it involves letting go of what has been done in the past. So he or she adopts strategies that help him or her avoid the functional fixedness .

Effective problem solvers also realize that other people are excellent sources of creative thinking. Rather than treat others as "people to carry out my ideas", they treat their co-workers as resources who can contribute to a group's thinking and problem solving. This is a major shift in thinking for many who are used to giving orders rather than listening.

A Case that illustrates how developing an understanding of a problem can lead to alternate goals.

The Radio play "Mooney Medical" is an excellent case for illustrating how the goal of attempting to understand a problem (as opposed to the goal of attempting to solve a problem that one is sure one understands) leads to very different goals for problem solving. In this case, the head of a rural hospital wants March to solve a problem she is sure she understands: the emergency medial people need to be replaced. March develops a different understanding of the problem and ultimately ends up with very different goals.

Her goal is essentially: How do I get rid of these worthless volunteers?

March's goal becomes: How do we harness the enthusiasm of these volunteers so that they will agree to further training?

Ask participants to think of analogous situations that come to mind.

Social Constraints on Creativity

Play (or re-play) the case "Fear Strikes Out" . Help participants identify aspects of the organizational structure of the company that seemed to stifle creativity. What are some alternatives? What about their own company?

IDEAL PROBLEM NAVIGATION GUIDE
PART 2
DEFINING ALTERNATIVE GOALS

Why

In the previous exercise the participants experienced the effects that different learning goals can have on success. In this exercise, we want the participants to start thinking about alternative goals for other types of real-world problems. They should pick a problem from the list they generated in lesson 2 or that they identified after that session. If there is not enough time for this exercise it can be given as take home exercise.

Who

This exercise will work for any size group.

Time Required

Version 1	**Version 2**
This exercise takes 15 - 25 minutes	This exercise takes 25 - 45 minutes

Supplies Required

Pens or Pencils
Copies of the Defining alternative goals form for everyone

IDEAL PROBLEM NAVIGATION GUIDE
PART 2
DIRECTIONS

Version 1

1. Break up class into pairs of individuals.
2. Distribute "Defining Alternative Goals" form to each person in the class.
3. Use example below to explain what alternative goals are.

Example Problem: I don't have enough money for everything I need

Goal 1: How can I spend less so my money goes further

Goal 2: How can I earn more money

Goal 3: How can I reduce my need for things that cost money

4. People often have a difficult time separating goals from strategies that they may use to accomplish goals. In fact, there is a good reason for this confusion, namely, as goals become more and more specific they begin to sound like strategies. To avoid this confusion remember to encourage people to formulate very general goals. Also, you may want to tell them that goals are what we want to accomplish and strategies are how we plan to accomplish our goals. You may want to use the analogy that goals are our destination and strategies are our roads to get there.
5. Have each member of the pair take a turn filling in their form with help from the other person. Ask each pair to think of all the possible alternative goals that could be pursued when trying to solve each problem.

Version 2

1 - 4 are same as above.
5. Have each person present their partners' problem and alternative goals to the class.

IDEAL PROBLEM NAVIGATION GUIDE

PART 2

DEFINING ALTERNATIVE GOALS

Directions: Pick one of the problems you identified in the take home assignment from the previous lesson that could provide an opportunity for creative problem solving. Describe that problem below. Then try to come up with three different goals you might try to pursue to solve that problem.

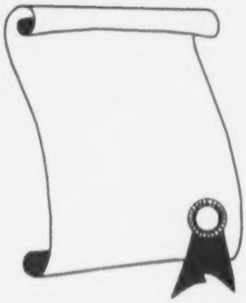
Problem: ______________________________

GOAL 1: ______________________________
____

GOAL 2: ______________________________
____

GOAL 3: ______________________________
____

MODULE 5



Perfecting the Art of Learning

Defining Learning Goals

Many of the problems people need to solve involve learning new information, hence the ability to learn new knowledge is essential. In this module the participants will see that the goals one sets for learning have a powerful effect on what is noticed and learned. Often people set inappropriate goals or vague goals and hence fail to learn as well as they could. To be more successful people must learn to clearly define the types of tasks they want to be able to accomplish with new information.

Goals

- Defining goals
- Listening Skills
- Preparing for tests
- Enhancing creativity
- Group learning & cooperation
- Making practice test questions
- Public Speaking

Exercise & Resource Options for Module 5

Resource#	Name	Purpose
E1	Golden Statuettes	Shows the need to define learning goals
E2	Defining Learning Goals Exercises	Shows the importance of defining learning goals
E3	Personal Learning Goals	Helps the participants define personal learning goals
E4*	Assessment	Evaluate progress

Module 5: Perfecting the Art Of Learning I:
Defining Learning Goals

1. Summary of Last Time and Overview

In Lesson IV we discussed the importance of developing an understanding of problems and of defining alternate goals. Attempts to explicitly define alternate goals enhance creativity because different goals suggest different types of potential strategies. For example, the goal "how do I keep traffic noise from entering my bedroom" suggests different strategies than the goal "how do I keep traffic noise from disturbing me while I sleep"?

Many of the goals needed for successful problem solving are **learning** goals. If I want to keep noise from entering my bedroom, I probably need to learn about materials that block out sound or perhaps absorb sound. If I want to learn how to keep noise that enters my bedroom from bothering me, I may need to learn if it is possible to "cancel out" sound that reaches my room.

The purpose of this lesson is to explore the relationship between our goals and our learning. First, we want to show that knowledge is extremely important for problem solving, hence the ability to learn new knowledge is essential. Second, we want to show that the goals one sets for learning have a powerful effect on what is noticed and learned. Often people set inappropriate goals or vague goals and hence fail to learn as well as they could.

2. The Need for Knowledge in Problem Solving

All problems we have solved so far have required a great deal of real-world knowledge. For example, the Noisy Office Room problem involves knowledge about doors, hinges, the idea that sound travels from a source, etc. Similarly, the Grocery Store Line problem requires knowledge of grocery stores, checkout lines, the fact that most people are busy and don't like waiting in line, etc. We did not have to think about this knowledge while solving these problems because most of us had already acquired it. In many other cases, however, the knowledge we have at the moment will not be sufficient to solve problems that we face. Therefore, we'll have to learn.

(As an aside, its useful to note that many courses on problem solving use only problems that do not require people to learn new knowledge. This misleads people into thinking that effective problem solving only involves general strategies that manipulate knowledge. In reality, most problems require a very strong knowledge base. Therefore, effective problem solving involves the ability to learn, and this requires setting learning goals.)

Resources describes an interesting problem to present to people. They are to imagine that they own a precious metals store. People frequently come in, show them some family heirloom such as little statues of various figures, and claim that "these are solid gold". They want the owners to buy the gold from them. The heirlooms always look like they are gold on the outside. The owner can't cut into them because that would ruin them. How can one determine whether various heirlooms are solid gold?"

Ask people to work in groups to solve this problem. If you have any engineers or scientists in the group who immediately know the answer, ask them to withhold their knowledge and simply act as coaches. The goal of the exercise is to help people experience a problem that requires a relatively sophisticated knowledge base.

Resources provides an answer to this problem. It requires a knowledge of the concept of "density", plus knowledge that different types of metals have different specific densities. Without this knowledge, the problem is difficult and probably impossible to solve.

3. Learning Goals and Their Effects

Resources includes exercises designed to help people understand the importance of clearly defining learning goals.Different learning goals draw our attention to different kinds of information and, ultimately, to different learning strategies. Many people learn inefficiently and ineffectively because they do not think about the importance of their learning goals.

In the exercises, all participants will hear the same information. However, different participants will be assigned different roles which involve different learning goals (e.g., some may be asked listen to this information from the perspective of a medical doctor who is worried about people getting sick). These roles will be assigned in writing so that people don't know one another's roles.

After hearing the information, participants will work in groups to develop a test of the "important" information that they heard. This test will be taken by the other groups in the room to see how well they learned.They will also take a test that you administer---one that they will not think is fair because your perspective is different from theirs. That's good; it's an insight we want them to have.

Since participants in each group will have listened to the information with different goals in mind, they will soon see that what seems important and gets noticed depends on one's goals.

An important lesson from this exercise is: Make sure you have valid goals when you are testing others. Know the goals of the tester when you are taking the test. (You might ask participants if they have ever experienced "unfair tests". Can they begin to understand why the instructor may not have considered them unfair?)

Version 1 of this exercise uses a radio play on audio cassette. Version 2 uses a narrative text that is read by the trainer.

4. Setting Goals for Their Own Problems

Ask participants to return to the problem(s) they have identified and are attempting to define for themselves and ask themselves about their own learning goals for solving it. Have they set any? What are they? Have they attempted to think more creatively by explicitly defining alternate sets of learning goals from which choose? *Resources* includes an information sheet they can use to help think about alternate learning goals.

Help people realize that their learning goals will get progressively refined as they think about and learn about their problems. People will often have a difficult time separating goals from strategies that they may use to accomplish goals. In fact, there is a good reason for this confusion, namely, as goals become more and more specific they begin to sound like strategies. To avoid this confusion remember to encourage people to begin by formulating very general goals. Also, you may want to tell them that goals are what we want to accomplish and strategies are how we plan to accomplish our goals. You may want to use the analogy that goals are our destination and strategies are our roads to get there.

5. Summary and Next Time

Most real world problems that we attempt to solve will require us to learn new information rather than simply retrieve information that we have already stored in memory. The art of successful learning involves paying attention to the learning goals we set for ourselves, and set for others as well. The goals we set have a powerful effect on what we notice and remember about situations. People with different goals experience the same situation in different ways.

Often, our learning goals are only vaguely defined, hence our learning is inefficient or less-than-creative. By attempting to explicitly define alternate possible goals, we can enhance our learning abilities.

An emphasis on learning goals highlights two very important lessons: Make sure you have valid goals when you are testing others. Know the goals of the tester when you are taking the test.

Next time we will continue to explore the art of learning by focusing on strategies that help us achieve important goals.

The Golden Statuette problem

Imagine that you own a precious metals store. Frequently, people come into your store with a priceless heirloom of some kind. Many come in with golden statuettes of various sizes. They look like they are gold and people claim they are solid gold. They want lots of money for them? But are they real gold? How could you tell?

You can't cut into the statuettes because that would ruin them. You can't keep paying for outside consultants to help you. How can you determine if things like this are really solid gold?

(If some engineers or scientists in the group know the answer, ask them to keep it to themselves and simply act as observers. The goal is to help people experience the importance of content knowledge for problem solving.

To answer the question you need to know several things. First, different metals (e.g., lead, gold, platinum, aluminum) have different densities. Gold is very dense. Lead is about 1/2 as dense as gold.

Second, density is a measure of weight divided by volume. The basic unit of density is grams per cubic centimeter.

You can measure the volume of an irregularly shaped object such as a statuette by placing it in a cylinder of water and seeing how much water is displaced by the object.

You can measure the weight of an object by weighing it.

By dividing its weight by its volume, you can determine its density.

The density of gold is approximately 19.4 grams per cubic centimeter.

The density of lead is approximately 11 grams per cubic centimeter.

• **Remember the movie Raiders of The Lost Ark,** where Indiana Jones tries to substitute a bag of sand for the Golden Idol sitting on a pedestal? Both the bag of sand and the Idol had close to the same volume. Is there any way they could be even close to equal in weight? (The density of sand is around 2 grams per cubic centimeter).

• **Ever hear the story of Archimedes shouting "Eureka"** after taking a bath and noting that this water rose as he entered the bath?

This gave him the insight of using the method of displacement to measure the volume of irregularly shaped objects. The king wanted Archimedes to determine if his new crown was really gold or if he had been cheated. Archimedes couldn't tell without ruining the crown until he came up with this insight.

DEFINING LEARNING GOALS EXERCISES

Why

These exercises are designed to help participants understand the importance of establishing clear learning goals. The participants will be assigned various roles (and goals) before hearing the information. They will work in groups to develop a test and then have other groups in the room who have different learning goals take their test. They will soon see that preparing for test questions requires some knowledge of the intended goals. Once those goals are clear it becomes much easier to prepare for tests. Version 1 uses a radio play on audio cassette. Version 2 uses a narrative text that is read by the trainer.

Who

These exercises can work for any size group with at least two individuals. But will work best for groups from 8-40.

Time Required

Version 1
This exercise should take from 45-60 minutes

Version 2
This exercise should take from 30- 45 minutes

Supplies Required

Version 1
Paper
Pens or Pencils
Audio cassette player or VCR
Radio Play
Assessment sheets

Version 2
Paper
Pens or Pencils
Assessment sheets

DEFINING LEARNING GOALS EXERCISE DIRECTIONS

Version 1- Radio Play

1. Individuals should be assigned to one of four groups.
2.. Cut the Radio Play "Genesis" Roles into four parts and give one to each group. Instruct the groups to "carefully read their instructions silently."
3.. Play the radio play for the class.
4. Announce the following: "Each group should construct a good fill-in-the-blank test about the information for your role". Then allow time for the groups to construct the test. You should walk around the room, make sure the groups are working effectively, and answer any questions.
5. Announce: " Please write down a number from 0-100 which reflects how well you think everyone in your group will do on the test".
6. Announce: "Now I am going to give you a test, try to answer each question correctly."

    1. What are the exact words of the first sentence of the radio play?
    2. What is the name of the city?
    3. What is the name of this radio episode?
    4. What was Inspector May's wise saying?
    5. What was the time clock turned into?

7. Have them score their own tests.

ANSWER KEY TO THE RADIO PLAY ASSESSMENT QUESTIONS

1. From Sea to Shining Sear, "Smart Radio" is on the air!
2. Major City
3. Fear Strikes Out
4. "A mistake does not close doors, but opens them."
5. a bird bath

8. Ask them whether they thought your test was fair. (Not many will agree). Do they think the test they constructed is fairer? (Most will agree)
9. Now ask the groups to take the tests they constructed and switch with another group. Have each group try to answer the other groups questions. Do they think the tests are fair?
10. Now ask the groups to give their roles to the group they gave their test to.
11. Have them listen to the radio play again.
12. Now, let them take the test again for that role.

13. Have them score this test.
14. Compare scores on the two identical tests and discuss how carefully defining the learning goals ahead of time can make it easier to prepare for a test.

Additional Directions

For participants with English reading and/or writing levels below sixth grade

When constructing your groups, make sure that each group has at least one individual who can read and write at least the six grade English level.

RADIO PLAY "GENESIS" ROLES

I. Company Mathematician - Listen carefully for any numbers which are presented. Try to remember them and how they fit into the story.

II. Company Personnel Manager - Listen carefully for names and descriptions of individuals in the video. Try to remember each one and their role.

III. Design Manager- Listen carefully for product descriptions. Try to remember the details of any products discussed.

IV. Detective - Listen carefully for any clues which will help you explain the lack of creativity at this plant. Try to remember them in order.

DEFINING LEARNING GOALS EXERCISE DIRECTIONS

Version 2 Product Testing

1. Individuals should be assigned to an even number of groups with a maximum of five individuals per group.
2. Cut the "Water Purification" Roles into separate parts and give one to each group. Instruct the groups to "carefully read their instructions silently."
3. Read the water purification passage.
4. Announce the following: "Each group should construct a good fill-in-the-blank test of the information for your role".
5. Announce: " Please write down a number from 0-100 which reflects how well you think you will do on the test".
6. Announce: "Now I am going to give you a test, try to answer each question correctly."

    1. What was Tom's friend's name and occupation?
    2. What kind of camera and lens is Sue going to use?
    3. Where did Tom and Sue meet?
    4. How old are the twins?
    5. What was the fifth sentence in the passage?

7. Have them score their tests.

    1. Rick Sanders, Lawyer
    2. Olympus OM-2 with a 35-80mm F3.5 lens
    3. Red River Gorge
    4. 18
    5. Their teenage twins, Ronald and Dianna, are looking forward to their first fishing trip.

8. Ask them whether they thought your test was fair. (Not many will agree.) Do they think the test they constructed is fairer? (Most will agree).
9. Now ask the groups to switch the test they constructed with another group. Have each group try to answer the other groups questions. Do they think the tests are fair?
10. Now ask the groups to give their roles to the group they gave their test to.
11. Have them listen to the passage again.
12. Now, let them take the test again for that same role.
13. Have them score this test.

14. Compare scores on the two identical tests and discuss how carefully defining the learning goals ahead of time can make it easier to prepare for a test.

Additional Directions

For participants with English reading and/or writing levels below sixth grade

When constructing your groups, make sure that each group has at least one individual who can read and write at least the six grade English level.

DEFINING LEARNING GOALS EXERCISE
Product Testing

I. Imagine you are Tom's travel agent. Listen carefully for any information that would help you make the plane reservations for the trip.

II. You are Tom's assistant, and his wife has asked you to plan his birthday celebration. You must arrange for a meal at their destination with everyone's favorite food. Listen carefully for any information that would help you plan this meal.

III. Imagine you are planning for medical problems. Listen carefully for any information that would help you plan for medical problems on the trip.

IV. You are a ranger who will be looking for these people when they get lost. Listen carefully for any information that would help you find them.

DEFINING LEARNING GOALS EXERCISE

Product Testing Passage

Tom Harwood, vice president of Tried and True Outdoor Products, is planning a trip to test some of the company's new fishing gear. He plans to take his family with him on the trip to the Canadian Rockies near Calgary. His wife, Sue loves to go outdoors but only reluctantly agreed to go because she is three months pregnant. One of the reasons she agreed to go is to celebrate Tom's 43d birthday on June 20th. They will be leaving the day before his birthday so they can celebrate his birthday in Canada. Their teenage twins, Ronald and Dianna, are looking forward to their first fishing trip.

Tom's guide book says the average temperature is about 55 degrees Fahrenheit during the day, however, it's not uncommon for it to snow 3 inches this time of year so Tom is planning on taking his lucky poncho (a bright orange thing that completely covers his 5 foot 8 inch frame. The temperature shouldn't be a problem, but Ronald will have to be careful because he got frostbite on a skiing trip last winter. They plan to hike to Black Glacier Lake about 5 miles from the Cedar Mountain Road on the first day and then follow the Rainbow trail as it winds around the East Fork area where the fishing is supposed to be outstanding. The trip will last for approximately 6 weeks. The area is designated a wilderness preserve and only low impact camping is permitted (no campfires).

With two teenagers, they will need plenty of food in addition to the fish that they catch. In fact, neither of the teenagers will eat fish. Diana is allergic to fish and Ronald just doesn't like it. He says he refuses to eat anything that people say is bad if it smells like itself. Ronald's favorite food is a hamburger and Dianna's is corn bread. Although they are only half Sue's age they seem to eat twice as much. On this trip those finicky eating habits won't bother Sue because she loves to eat fresh fish, but hates to catch them. The only food she likes better is cheesecake. She usually does nature photography while the rest of the family is fishing. She uses an old Olympus OM-2 with a 28 to 80 mm F3.5 lens. The six week trip will give her plenty of time to photograph streams. They want to carry as light a load as possible because Tom hurt his left knee playing softball two weeks ago.

Sue has always liked outdoor activities, in fact, she and Tom met on a group outing 19 years ago in the Red River Gorge when she was 17. Although she is quite slender and fragile looking, she has always been a strong hiker. Tom gave her a red bandanna to go with her blonde hair on that first outing when she made his favorite dinner, jambalaya. She still takes the bandanna on every trip they make but she never wears it at home in Kansas City.

Tom is a little concerned because the guide book says that the water is probably contaminated with something called Giardia. He was thinking about getting something to treat the water, however, his friend, Rick Sanders, said not to worry. He has traveled to this area every year with his law partners for the last 7 years and has never gotten sick from the water.

Module 6

Perfecting the Art of Learning II

Exploring Strategies

In this module the participants will explore comprehension strategies and their relationship to their learning goals. A key idea in this module is that whenever you try to learn something new there are different levels of understanding that are possible. The level we need to achieve depends on the problems that we need to solve. For example, knowing that there is something wrong with your car's exhaust system, and knowing how to fix the problem require different levels of understanding.

In order to learn effectively, we must make sure that our personal goals for learning are consistent with the kinds of problems we will eventually need to solve. We also need to make sure the strategies we use for learning are consistent with our learning goals.

Goals

- Explore comprehension strategies
- Improve reading comprehension
- Searching for new information
- Improve confidence
- Improve memory skills
- Applying math skills
- Define learning goals
- Promote group interaction
- Improve problem solving
- Develop note-taking skills
- Improve critical thinking

Exercise & Resource Options for Module 6

Resource#	Name	Purpose
F1	Pill Problem/ Vein & Artery Problem	Learning about different levels of processing.
F2	Comprehension Exercise Purifying Water	Practice choosing appropriate comprehension strategies.
F3	IDEAL Problem Navigation Guide: Part 3	Exploring strategies for real world problems
F4*	Assessment	Evaluate progress

6-1

Module 6: Perfecting the Art of Learning II:
Exploring Strategies

1. Overview and Last Time

Last time we focused on the fact that most real world problem solving requires us to learn new information, and that learning is strongly affected by the learning goals we adopt. Often these goals are vague and not explicitly articulated. Therefore our learning is less than IDEAL.

In this lesson we focus on the E in IDEAL: Exploring strategies and examining their relationship to our goals.The key idea of this lesson is that there are different levels of understanding that are possible. The level we need to achieve depends on the problems that we need to solve. Some simple examples are provided below.

2. Levels of Understanding and Problem Solving

•**The Pill Problem:** Participants might be asked to consider the following problem:

Bill discovered that he was allergic to milk products. His doctor told him to take a special pill 1/2 hour before eating. Bill understood the directions well and purchased the correct pills. His level of understanding was purely procedural (buy this kind of pill and take it 1/2 hour before eating a meal). Is this level sufficient to solve his problem? (Ask people to react to this).

Bill's level of understanding is probably fine provided that he remembers to take the pill 1/2 hour before eating. However, what if dinner is served in 10 minutes and he realizes he hasn't taken the pill? Is it O.K. to do so now ? What if he forgets to take it until he is finished eating? Should he still take it?

Under these conditions Bill needs more information. He might need a whole list of contingencies (e.g., it's O.K. to take 10 minutes before if the amount of milk to be consumed is moderate; however, if it..... etc.....). Alternatively (and preferably), Bill may needs to develop an understanding of how the pill works. This understanding can help him make decisions on his own. Overall, the moral is that we need different levels of understanding depending on the kinds of problems we need to solve.

• **The Veins and Arteries Problem:** *Resources* contains information about this problem. It can be used to illustrate how different levels of understanding about veins and arteries are or are not sufficient depending on the problem one needs to solve.

3. Strategies for Learning New Information

Resources contains an exercise to help participants learn about learning strategies. It asks participants to imagine that they are in charge of helping their fellow co-workers plan camping trips in wilderness areas. They need to make sure that the people have safe water to drink throughout their trip.

Participants will need to learn information to prepare for their problem solving challenge. And the levels of understanding they will need will depend on their goals. For example, the materials to be learned include information about units of measurement that are probably unfamiliar such as a micron. One strategy for learning is to relate that concept to a unit of measurement you already know (1 micron (4/100,000 of an inch) or to the size of an object you already know (a human hair is about 20 microns).

In other situations one may need to achieve a different set of goals; for example, to measure a micron. This requires learning about devices capable of making very small measurements.

In this lesson, the participants will get to explore comprehension strategies that require different levels of understanding depending on their learning goals. They will explore differences between memorizing information and understanding it well enough to solve problems. And they will explore ways of taking notes and systematically representing information as they learn.

4. Focusing on Their Own Problems

You might ask participants to return to their own problems that they are working on and think about their learning strategies in relationship to their goals. Ideally, members of the workshop can help one another. Is there a need to learn more about the kinds of problems they need to prepare for? Are there strategies for learning that they might use?

5. Summary and What's Next

We explored "The Art of Learning II" by focusing on the E in IDEAL: Exploring learning strategies and examining their relationship to our goals.The key idea of this lesson was that there are different levels of understanding that are possible. The level we need to achieve depends on the problems that we need to solve. The clearer we are about these problems, the clearer we can be about our learning goals and about the learning strategies we use.

Next time we will build on these ideas by focusing on the next phase of IDEAL: "Anticipate the effects of one's strategy choices before you have to actually Act on them. We will do so by giving ourselves the problem of assessing what someone else knows and understands.

The Pill Problem:

Purpose: Help people understand that information can be understood at different levels. The level you need depends on the nature of the problem that you need to solve.

The problem: Bill discovered that he was allergic to milk products. His doctor told him to take a special pill 1/2 hour before eating. Bill understood the directions well and purchased the correct pills. His level of understanding was purely procedural (buy this kind of pill and take it 1/2 hour before eating a meal). Is this level sufficient to solve his problem? (Ask people to react to this).

Answer to the problem: Bill's level of understanding is probably fine provided that he remembers to take the pill 1/2 hour before eating. However, what if dinner is served in 10 minutes and he realizes he hasn't taken the pill? Is it O.K. to do so now ? What if he forgets to take it until he is finished eating? Should he still take it? Under these conditions Bill needs more information. He might need a whole list of contingencies (e.g., it's O.K. to take 10 minutes before if the amount of milk to be consumed is moderate; however, if it..... etc.....).

Alternatively (and preferably), Bill may needs to develop an understanding of how the pill works. This understanding can help him make decisions on his own. Overall, the moral is that we need different levels of understanding depending on the kinds of problems we need to solve.

Veins and Arteries Problem

Purpose: Illustrate different levels of understanding needed for different types of tests.

Veins and arteries both carry blood. Arteries are relatively elastic and carry blood from the heart. Veins are less elastic and carry blood back to the heart.

Is this enough to know about veins and arteries?

The answer depends on the nature of the test you need to take (i.e., the nature of the problem you want to solve).

Question 1:

Arteries are:

a. good to eat
b. a type of insect
c. an important part of the body
d. sold only at gas stations
e. a kind of tree.

One doesn't need to know much about veins and arteries to answer this question.

Question 2:

Why might arteries (but not veins) need to be elastic?

(To accommodate the changes in pressure from the blood being pumped from the heart. Also, to act as one way valves that keep blood from flowing downward as it is pumped against gravity (e.g. to the neck and brain).
Clearly, the why question requires more information than the first one.

Question 3:

If one's goal is to build an artificial artery, does it have to be elastic?

(Not necessarily. It needs to duplicate the functions of arteries, not necessarily the exact structure. If the material could withstand pressure from the heart, and accommodate a one-way value the keeps blood from flowing backward, it might not need to be elastic).

The moral is:
The need to solve different types of problems requires different levels of understanding of concepts.

Our learning goals need to be set so that they coincide with the kinds of problems we need to solve when using new information. If they don't, our learning often won't be effective.

Comprehension Exercise

Purifying Water

Why

The comprehension exercise is designed to help the participants explore a variety of comprehension strategies. This exercise will require the participants to learn some new concepts and terminology. They will have to relate these new ideas to familiar experiences, and they will have to obtain additional information to solve the problem. The exercise will encourage them to explore note taking and memory skills. They will also have to critically evaluate which information is useful.

The exercise also shows participants how different goals demand different levels of understanding. Therefore, it is important for them to clarify their goals ahead of time.

Version 1 of this exercise lets the participants play the role of an expert on some aspect of the problem. Version 1 should be more interesting and motivating if the participants have at least a sixth grade reading level. In Version 2 of this exercise the trainer keeps all of the expert information needed to solve the problem. Version 2 is recommended in situations in which most participants have reading skills below sixth grade level.

Who

This activity is suitable for 4 to 20 participants.

Time Required

This exercise can take from 30-75 minutes depending on the number of problems given and the participants' education level.

Supplies Required

Version 1	Version 2
Paper & Pencils	Paper & Pencils
Play money	Play money
Dictionaries if possible	Dictionaries if possible
4 copies of each piece of background information	

Comprehension Exercise Directions

Version 1 and 2

How

Phase 1

1. Pass out blank paper and pencils.

2. Announce to the class "I want you to listen carefully to some information. I am going to ask some questions about it afterwards."

3. Read one of the three problem situations on the next page to the participants.

4. Ask them to answer the following questions on the paper provided.

   Pretest

   1. Write down everything you can remember about the passage.
   2. What method of obtaining safe drinking water was recommended?
   3. Do you think the method for obtaining safe water that was recommended by the friend should be used?
   4. What additional information would you need to feel comfortable with the latter decision?

5. At this point you might want to discuss their answers (but don't give the correct answers). How accurately did people remember the passage? You might want to talk about what they could do to remember it more accurately. This is a good point to talk about differences between memorization strategies and comprehension strategies. **Taking notes should be suggested as one possible strategy for remembering information.**

6. Many people go along with the recommendation given in the passage. This question is a pretest of their understanding of the problem.

Comprehension Exercise Directions
Phase 2

In the second phase of this exercise the participants are given the opportunity to improve their understanding of the problem and give a recommendation for purifying water.

1. Divide the individuals into four groups (two groups can be used with smaller classes). You should try to divide the individuals with the highest English reading levels equally among groups.

2. Distribute the money equally to all groups.

3. Announce to the groups, "Imagine that you are the company assistant for the individual planning the trip. Your task is to make sure that no one gets sick but also to be as frugal as possible. You have to decide what is the single best method of purifying water for the trip while spending the least amount of money. For those groups who would like me to re-read the passage, I will be happy to do so. The cost is $100 for each time that I read it or $150 dollars if you want me to read it slower and allow you to take notes. Dictionaries are available free of charge (if available)".

Additional Directions for Version #1

4. Distribute 4 copies of each piece of information to each group and announce to the groups, "each group also has information to sell. The price is on the information. When a group purchases information from you, you should give them a copy of that information to take with them." Give each group a list of the available types of information.

Additional Directions for Version #2

4. "There are also a variety of other types of information available to you for a certain fee." Give each group a list of the available types of information.

5. Read and/or show the requested information and collect the money from the groups. (Note: You may want to go to a corner or to another room when reading so that all the groups don't hear you).

Comprehension Exercise Directions
Phase 2

Additional Directions for Versions 1 & 2

6. Pass out Worksheets that participants can use to keep track of the information in the problem.

Hint: General Problem Solving Strategy
Work it out for a Specific Case

Sometimes a problem is easier to solve if you start with a simple specific case and see what can be learned in that situation. This is a good strategy to use when there are many possibilities.

Demonstration Problem

Your company has established a fitness program. Imagine you are in charge of buying score cards for a single elimination (you only play another match if you win your current match) tennis tournament. If there are 98 contestants, how many score cards will you need?

Answer: If you work it out for a simple specific case like two contestants, you will discover that you always need one less card than there are players or 97 cards for 98 contestants.

Applying the Strategy to the current task

Start with a specific water purification device, and see if it satisfies all the conditions. Use the worksheet table to help you keep track of information.

6. Allow time for the groups to solve their problems. You may want to walk around the room and make sure that the groups are working effectively.
7. When everyone is finished or time is up ask the following questions.

Post test

1. Write down everything you can remember about the passage.
2. What method of obtaining safe drinking water was recommended?
3. Do you think the method of obtaining safe water was good?
4. Which method did you choose?
5. What additional information did you need to make your decision?
6. How much money do you now have?

8. Find out which groups made the correct decision.

9. Of the groups which made the correct decision, which one now has the most money.

10. Discuss the scenario.

11. Discuss exploring appropriate comprehension strategies.

12. If time allows, you may want to do another scenario.

Comprehension Exercise

Three Water Purification Problems

Situation # 1

Tom is planning a trip in the Canadian Rockies to test some new fishing gear his company has developed. He plans on taking his wife, Sue, and his two teenage twins, Ronald and Donna. His wife is pregnant with their third child. The average temperature is expected to be about 50 degrees Fahrenheit. They plan to hike about five miles each day working their way into the East Fork area. The trip will last for approximately 6 weeks. The area is designated a wilderness preserve and only low impact camping is permitted (no campfires). The family needs to be able to obtain safe water each day from the river or any one of many glacier lakes. They want to carry as little as possible to make the hiking easier. They will need about 3 gallons of water each day. The ranger says that the water is possibly contaminated with Giardia. However, Tom's friend, Rick, traveled to this area about 15 years ago and says that he did not treat the water at all and he did not get sick.

Situation # 2

Maria, a cost conscious executive, is planning a three day business trip to Mexico. The average temperature will be about 95 degrees Fahrenheit. She will not be climbing to high altitudes. No hotel rooms are available with any form of kitchen facilities. Maria will be in Mexico for approximately 3 days and will need approximately 3 gallons of water. She has a sprained wrist from falling out of her office chair. She has limited space available in her luggage and is afraid of going over the weight limit allowed by the airlines. She is also afraid that bottled water will not always be available. She has been warned that Hepatitis has contaminated the New River, the main water source for this area. Her friend, Tim, recommends that she use a Sweetwater filter. He used one when he was hiking in the Smokies and found it to be very effective.

Situation # 3

Mary is planning a cross-country skiing trip in Colorado. The air temperature is expected to be considerably below freezing most of the time. The park in which she is hiking is frequented by many tourists each year. A case of E-coli was reported to have infected someone traveling in the same area. She will be hiking for two days and will need approximately 2 gallons of water. Mary is allergic to iodine. She also wants to have as light of a pack as possible and she would like to spend as little money as possible. Her friend, Bob, recommends that she use a PUR water purifier since he used one on his last trip to this area last July and did not suffer from any ill effects.

Comprehension Exercise

Types of Additional Information Available

Water Pollutants- $100

Expert Recommendations- $50 each

Field tests - $100

Product information - $100

Principles of Water Purification for Travelers- $100

Re-reading Passage- $100 without pauses for note taking

- $150 with pauses for note taking

Comprehension Exercise
Product Information (Price $100)

Method	Device	Filters particles as small as	Weight (in oz.)	Force required to pump in Lbs.	Output Liters/min	Capacity (in gal.)	Price
Micro Filtration with carbon	Sweetwater Guardian filter	.2 microns	11	2	1.0	200	$50
Micro Filtration	Katadyn Pocket Filter	.2 microns	22.7	20	.73	13,000	$250
Micro Filtration with carbon	First Need filter	.4 microns	14.5	9	1.1	100	$45.50
Purifier	Pur Explorer	1 micron	24.8	5	1.39	300-500	$140
Purifier	Pocket Straw	1 micron	3	-	-	60	$20

Product	Destroys	Weight (in oz.)	Capacity (in gal.)	Price
Aquapure Iodine tablets	Most protozoa, bacteria, viruses	1	10.5	$4.50

Product	Stove Wt. (In oz.)	Water boiled per pint of fuel (qts.)	Fuel Wt. Per pint (in oz.)	Fuel	Stove Price
MSR Gas stove	14	29	15	Gasoline or Kerosene	$65.00

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Comprehension Exercise

Camping Expert Recommendation (Price $50)

We recommend the Pur Explorer filter because it neutralizes almost any type of biological contaminant.

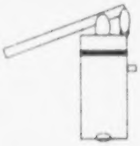
Comprehension Exercise

Field Tests (Price $100)

Aquapure Tablets

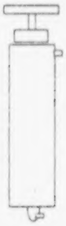
Simple to use iodine tablets. Drop a tablet in a quart of water and let it stand for about 20 minutes before drinking (longer in colder temperatures). Tablets lose one third of their effectiveness after bottle is open more than a four days. Gives water an unpleasant taste (iodine). Iodine is less effective at low temperatures.

Sweetwater Guardian Filter



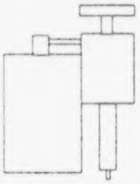
Filter has lever style pump that is easy to operate and requires the least force of any pump mechanism. Made of unbreakable plastic. Compact and light weight. Connects directly to water bottle. Carbon filter also removes some chemicals.

Katadyn Pocket Filter



Filter has long life ceramic cartridge. Pump is plunger style making it more difficult to operate than a lever. Does not connect to bottle but has awkward spout that must be positioned over bottle.

First Need Filter



Filter pump is plunger style making it more difficult to operate than a lever. Compact and light weight. Connects directly to water bottle. Carbon filter also removes some chemicals .

Pur Explorer Purifier

Pump is plunger style making it more difficult to operate than a lever. Connects directly to water bottle. Gives water slight iodine taste. Iodine matrix is less effective at lower temperatures but no instructions are included for low temperature operation.

Pocket Straw Purifier

This device resembles a straw. User must insert one end in water source and other end in mouth. Filters and purifies water using iodine matrix. Gives slight iodine taste. Has limited application since all water must be consumed as it is purified. Requires considerable suction - like drinking a very thick milkshake through a straw. Iodine is less effective at lower temperatures but no instructions are included for low temperature operation.

Comprehension Exercise

Expert Recommendation of Field Tester (Price $50)

I prefer the Sweetwater guardian filter because it requires the least force to operate and is relatively simple to use.

Comprehension Exercise
Principles of Water Purification for Travelers (Price $100)

There are basically 4 methods for treating water suspected of containing microbiological pollutants when traveling.

Boiling

The simplest and most effective method for purifying water is boiling. Boiling water for 10 to 20 minutes will kill the vast majority of bacteria, protozoa and viruses. The only problems with boiling are that it can be inconvenient, requires a stove with extra fuel, and will not remove suspended particles so that the water may still look cloudy. Boiling water over a camp fire can be difficult even when dry wood can be found and regulations permit camp fires.

Chemical Treatment

The second method involves the use of chemicals to kill biological organisms. Iodine and chlorine are commonly used. Iodine is best because chlorine does not kill all protozoa and is less effective in cold water. Iodine kills most protozoa, bacteria and viruses. The disadvantages of iodine are that it is not recommended for long term use (iodine is toxic) and some people are allergic to iodine. Iodine can also be harmful to people with thyroid conditions and to unborn babies. Iodine also leaves a distinctive unpleasant taste in the water.

Microfiltration

The third method involves microfiltration down to .2 microns. This removes most protozoa and bacteria from the water but does not remove viruses. Some filters use carbon membranes which also remove other chemical pollutants. These devices are not recommended when the temperature will remain below freezing because the filter membranes may freeze and crack.

Purifiers

Another method involves a process known as water purification. These devices usually resemble filters but only remove some of the larger microbiological organisms. The remaining organisms are killed by iodine in the filter. These devices are not recommended when the temperature will remain below freezing because the filter membranes may freeze and crack.

Comprehension Exercise

Expert Recommendation from Bio-Chemist (Price $50)

If I was going to kill all the microorganisms in water that was contaminated, I would boil it for 20 minutes in the laboratory.

Comprehension Exercise

Water Pollutants (Price $100)

Protozoans such as Giardia and Cryptosporidia range in size from 3 to 15 microns in size. These pollutants can cause severe diarrhea and vomiting in certain individuals. Some individuals are relatively immune to the effects of these pollutants. Protozoans such as Giardia can be found in 90% of the lakes, rivers and streams in the US.

Bacteria such as E. Coli range in size from .2 to 10 microns. Bacteria such as E. Coli can cause severe diarrhea and vomiting . These pollutants can be fatal for people with weak immune systems and for young children. Bacteria are commonly found in all surface water (lakes, streams and rivers).

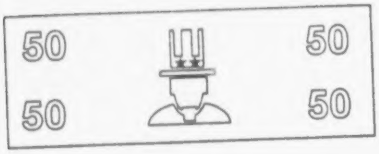
Viruses such as Hepatitis range in size from .004 to .1 microns . While some viruses produce symptoms similar to Giardia, others can lead to more serious problems, or even death. Viruses are not common in North American lakes and streams unless they have been contaminated by raw sewage during flooding. Viruses are more commonly found in less developed countries like Mexico where there are inadequate sewage treatment facilities.

Chemical pollutants such as pesticides, and manufacturing waste products can be toxic if they occur in high concentrations. These pollutants are usually only found in high concentrations in water fed by factory and farm drainage.

Comprehension Exercise

Expert Recommendation from Medical Doctor (Price $50)

Chemical treatments have been clinically tested and found to be an effective method of making water safe to drink.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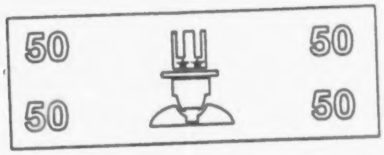
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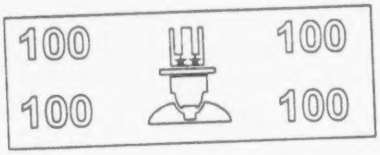
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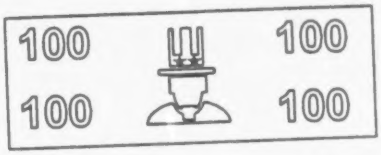
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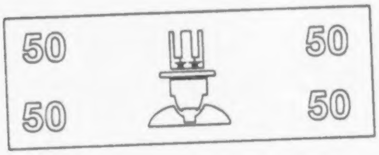
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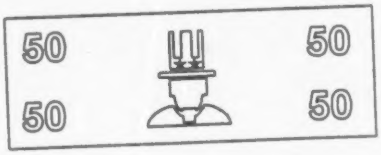
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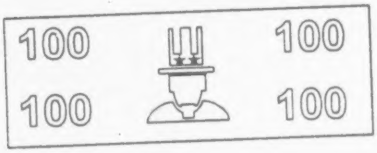
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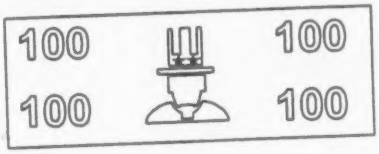
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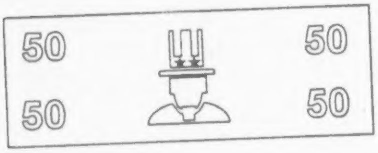
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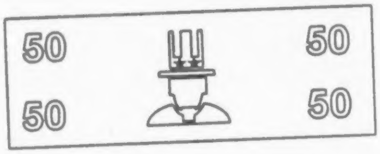
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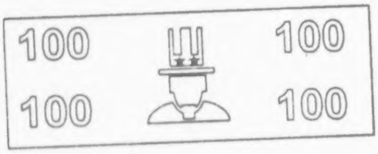
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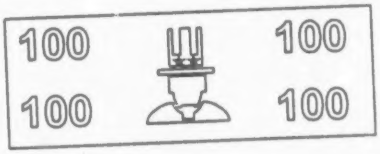
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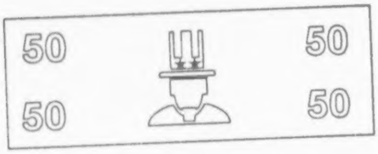
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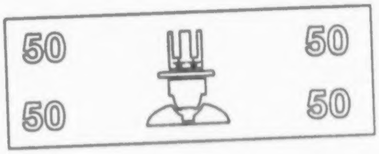
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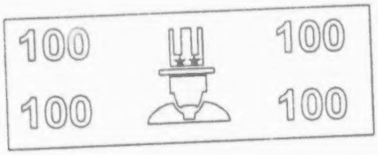
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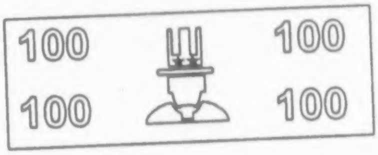
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Worksheet for Comprehension Exercise

Device	Capacity in Quarts	Weight	Cost	Force required	Removes	Does it contain Iodine
Number required=	= needed quantity	= Maximum wt.	= total expenditure	strength required	Pollutants	Is it unsafe for fetuses, and iodine allergies
Number required=	= needed quantity	= Maximum wt.	= total expenditure	strength required	Pollutants	Is it unsafe for fetuses, and iodine allergies
Number required=	= needed quantity	= Maximum wt.	= total expenditure	strength required	Pollutants	Is it unsafe for fetuses, and iodine allergies
Number required=	= needed quantity	= Maximum wt.	= total expenditure	strength required	Pollutants	Is it unsafe for fetuses, and iodine allergies
Number required=	= needed quantity	= Maximum wt.	= total expenditure	strength required	Pollutants	Is it unsafe for fetuses, and iodine allergies

Best Device =

Comprehension Exercise
Correct Answers

Situation #1

Giardia affects some people but not others. Tom should plan on treating the water. Since he does not expect viruses to be present and they are not common in this environment, a filter would work. He should also stay away from iodine treatments because iodine can harm fetuses. Since camp fires are not permitted, boiling would require a large amount of fuel. The best filter in terms of price, weight, performance, and ease of operation is the Sweetwater Guardian filter.

Situation #2

Maria is traveling to an area where viruses may be present in the water. Filters alone cannot remove viruses. Maria would either have to use either a chemical purification treatment or boil the water. Since she hurt her wrist, a chemical purifier with a pump would not be appropriate. It would be difficult for her to boil water. Since she is not allergic to iodine, Aquapure tablets would be the simplest and best method.

Situation #3

Mary is allergic to iodine so she can't use chemical treatments or water purifiers that contain iodine like the Pur Explorer. Since the air temperature is going to be below freezing most of the time, a filter would probably not work since the water would freeze in the cartridge and possibly damage the unit. Mary's best option is to boil the water with her stove.

IDEAL PROBLEM NAVIGATION GUIDE

Part 3

EXPLORING POSSIBLE STRATEGIES

You have defined at least three alternative goals to your problem. We are now ready to explore strategies to accomplish these goals.

Goal 1: ____

Strategy 1: ____________________________________

Strategy 2: ____________________________________

Strategy 3: ____________________________________

Goal 2: ____

Strategy 1: ____________________________________

Strategy 2: ____________________________________

Strategy 3: ____________________________________

Goal 3: ____

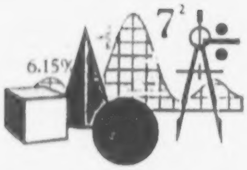
Strategy 1: ____________________________________

Strategy 2: ____________________________________

Strategy 3: ____________________________________

MODULE 7

Assessing What We Know



Anticipating Effects and then Acting

The purpose of this module is to focus on the importance of anticipating the effects of one strategies before actually acting on them. This can be extremely important. It lies at the heart of all our efforts to prepare for important events. How do you know if the strategies you have used to prepare a presentation for an important meeting are adequate? How do you know if the study strategies you are using to prepare for a test are going to work?

There is no single answer to these questions, of course. However, the best single method is to think about the problems you will be asked to solve when you do your presentation or take your test. What questions are people likely to ask? What will they expect you to know? How well will they expect you to be able to explain yourself? These will help you clarify the levels of understanding you will need, which in turn should help you set useful learning goals. The more you can anticipate the situations in which you will have to use information, the more accurately you can anticipate the effects that your current learning strategies will have.

Goals

- Anticipating problems
- Developing test preparation skills
- Making practice test questions
- Group learning & cooperation
- Developing math skills
- Enhancing creativity

Exercise & Resource Options for Module 7

Resource#	Name	Purpose
G1	Create an Assessment	Practice creating assessment tools to evaluate learning
G2	IDEAL Navigation Guide Part IV	Anticipate effects of using strategies in their own problem
G3	Learning Strategies Assessment	Help participants assess their strengths and weaknesses
G4*	Assessment	Evaluate progress

Module 7: Assessing What We Know:
Focusing on the A in IDEAL

The IDEAL Framework emphasizes the important of anticipating the effects of one strategies before actually acting on them. This can be extremely important. It lies at the heart of all our efforts to prepare for important events. How do you know if the strategies you have used to prepare a presentation for an important meeting are adequate? How do you know if the study strategies you are using to prepare for a test are going to work?

There is no single answer to these questions, of course. However, the best single method is to think about the problems you will be asked to solve when you do your presentation or take your test. What questions are people likely to ask? What will they expect you to know? How well will they expect you to be able to explain yourself? These will help you clarify the levels of understanding you will need, which in turn should help you set useful learning goals. The more you can anticipate the situations in which you will have to use information, the more accurately you can anticipate the effects that your current learning strategies will have.

1. Understanding Learning By Assessing the Learning of Others:

There is one exercise in this lesson (see *Resources*). It takes a considerable amount of time to accomplish. However, it is excellent for helping people learn to anticipate the effects of various learning strategies. Basically, the exercise puts the participants in the position of creating assessments that they can use to see if someone else knows enough to be believable as an expert. If they want to hire someone is who is good in a particular area, what should that person be able to know and do?

The exercise in resources requires some use of mathematics as well as of new content knowledge. This can be important for helping some people who don't see the value of mathematics. Overall, the exercise has a number of positive benefits.

2. Generating Self Assessments:

. Invite participants to generate assessments for the problem area that they have been working on. What assessments would they suggest to show that they have made progress? Will others take this as evidence, or will more evidence be required? Ask people to discuss these issues with the rest of the group.

3. Summary and What's Next

This module focused on the importance of anticipating the effects of one strategies before actually acting on them. This can be extremely important because it lies at the heart of all our efforts to prepare for important events. How can we know when and whether we are prepared?

We can never no for sure until we actually do the task. Nevertheless, there are ways to get a good idea. Probably the best single method is to think about the problems we will be asked to solve when we do the event we are preparing for. The more we can anticipate these situations, the easier it is to anticipate the effects of our current learning strategies. Hopefully, today's exercise provided insight into relationships between the kinds of problems people need to solve and the kinds of learning they need to have done.

Next time we will focus on effective communication. It too involves an emphasis on anticipating whether our current preparation will let us solve the communications problems that we eventually will face.

CREATE AN ASSESSMENT TOOL EXERCISE

Why

The "create an assessment tool" exercise is designed to help the participants evaluate the effectiveness of comprehension strategies they used in the previous session. The activity also encourages people to think about real world problems where new information may be useful. In the latter case, the activity should improve people's ability to transfer new knowledge in creative ways.

The exercise will require the participants to develop an assessment device to see if someone else knows enough about the information provided to be an expert.

Who

This activity is suitable for 4 to 24 participants.

Time Required

This exercise can take from 35-75 minutes depending on the version and participants' education level. Version 2 is the same as Version 1 but it gives the rest of the class the opportunity to evaluate each group's problem scenario and is recommended if there is sufficient time.

Supplies Required

Version 1	**Version 2**
Paper & Pencils	Paper & Pencils
Dictionaries if possible	Dictionaries if possible
4 copies of each piece of background information	4 copies of each piece of background information
Create an assessment tool worksheet	Create an assessment tool worksheet

CREATE AN ASSESSMENT TOOL EXERCISE DIRECTIONS

Version 1

1. Individuals should be assigned to one of four groups.
2. Distribute the information sheets that individuals used in lesson 4 dealing with water purification. This time each group should get one of each of the different pieces of information.
3. Tell each group that they are to develop an assessment device to see if someone else knows enough about the information provided to be an expert. They should think about what they want that person to be able to do if they hired them. The assessment tool should be able to be solved by other people in the class with the following provisions.
   - There should be only one correct solution if people have correctly used all of the information.
   - In order to determine the correct solution, a number of mathematical calculations must be made.
   - The solutions should require people to use information from all of the handouts.

Hint: General problem Solving Strategy

Working Backwards

Sometimes a problem is easier to solve if you start with the goal or answer and work backwards. This strategy is useful whenever the goal is clearly defined or is somewhat apparent.

Demonstration Problem

Imagine the number of products in a warehouse doubles every day. If the warehouse is completely full on day 29, on what day will the warehouse be exactly 1/2 full.
Answer: If you work backwards, it will be half full on day 28.

Applying the Strategy to the current task

Start with a particular solution, and try and build a scenario that would rule out all other solutions using mathematical computations and other information from the information sheets.

4. Have participants use the Create an Assessment Tool Worksheet to find the unique characteristics of the chosen device.

5. Fill in information for the alternative devices to find critical differences.
6. Then have them write a description that incorporates the unique characteristics.
7. The trainer should work with each group to help them evaluate their problem and proposed solution to see if there is just one correct solution to the problem.

Additional Directions

For participants with English reading and/or writing levels below sixth grade

When constructing your groups, make sure that each group has at least one individual who can read and write at least the six grade English level.

CREATE AN ASSESSMENT TOOL EXERCISE DIRECTIONS

Version 2

1-6. Follow the same directions as Version 1 up to step .7

7. When each group is finished developing their problems and solutions they should exchange their problems (not solutions) with another group and have them solve the problem.

8. Let the groups discuss the problems to see if they both came up with the same answer. If they did not both come up with the same answer was it because the problem had more than one answer, or was it because people solved the problem incorrectly.

Additional Directions

For participants with English reading and/or writing levels below sixth grade

When constructing your groups, make sure that each group has at least one individual who can read and write at least the six grade English level.

CREATE AN ASSESSMENT TOOL EXERCISE
Worksheet for Anticipating Problems

Best Device	Weight	Capacity in Quarts	Cost	Force required	Removes	Does it contain Iodine
number required =	= Maximum wt.	= needed quantity	= total expenditure	strength required	Pollutants	Is it unsafe for fetuses, and iodine allergies

Alternatives

Other Devices	Weight	Capacity in Quarts	Cost	Force required	Removes	Does it contain Iodine
number required =	= Maximum wt.	= needed quantity	= total expenditure	strength required	Pollutants	Is it unsafe for fetuses, and iodine allergies
number required =	= Maximum wt.	= needed quantity	= total expenditure	strength required	Pollutants	Is it unsafe for fetuses, and iodine allergies
number required =	= Maximum wt.	= needed quantity	= total expenditure	strength required	Pollutants	Is it unsafe for fetuses, and iodine allergies
number required =	= Maximum wt.	= needed quantity	= total expenditure	strength required	Pollutants	Is it unsafe for fetuses, and iodine allergies

CREATE AN ASSESSMENT TOOL EXERCISE
Background Information

Method	*Device*	*Filters particles as small as*	*Weight (in oz.)*	*Force required to pump in Lbs.*	*Output Liters/min*	*Capacity (in gal.)*	*Price*
Micro Filtration with carbon	Sweetwater Guardian filter	2 microns	11	2	1.0	200	$50
Micro Filtration	Katadyn Pocket Filter	.2 microns	22.7	20	.73	13,000	$250
Micro Filtration with carbon	First Need filter	.4 microns	14.5	9	1.1	100	$45.50
Purifier	Pur Explorer	1 micron	24.8	5	1.39	300-500	$140
Purifier	Pocket Straw	1 micron	3	-	-	60	$20

Product	*Destroys*	*Weight (in oz.)*	*Capacity (in gal.)*	*Price*
Aquapure Iodine tablets	Most protozoa, bacteria, viruses	1	10.5	$4.50

Product	*Stove Wt. (In oz.)*	*Water boiled per pint of fuel (qts.)*	*Fuel Wt. Per pint (in oz.)*	*Fuel*	*Stove Price*
MSR Gas stove	14	29	15	Gasoline or Kerosene	$65.00

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CREATE AN ASSESSMENT TOOL EXERCISE

Background Information

Aquapure Tablets

Simple to use iodine tablets. Drop a tablet in a quart of water and let it stand for about 20 minutes before drinking (longer in colder temperatures). Tablets lose one third of their effectiveness after bottle is open more than a four days. Gives water an unpleasant taste (iodine). Iodine is less effective at low temperatures.

Sweetwater Guardian Filter

Filter has lever style pump that is easy to operate and requires the least force of any pump mechanism. Made of unbreakable plastic. Compact and light weight. Connects directly to water bottle. Carbon filter also removes some chemicals.

Katadyn Pocket Filter

Filter has long life ceramic cartridge. Pump is plunger style making it more difficult to operate than a lever. Does not connect to bottle but has awkward spout that must be positioned over bottle.

First Need Filter

Filter pump is plunger style making it more difficult to operate than a lever. Compact and light weight. Connects directly to water bottle. Carbon filter also removes some chemicals .

Pur Explorer Purifier

Pump is plunger style making it more difficult to operate than a lever. Connects directly to water bottle. Gives water slight iodine taste. Iodine matrix is less effective at lower temperatures but no instructions are included for low temperature operation.

Pocket Straw Purifier

This device resembles a straw. User must insert one end in water source and other end in mouth. Filters and purifies water using iodine matrix. Gives slight iodine taste. Has limited application since all water must be consumed as it is purified. Requires considerable suction - like drinking a very thick milkshake through a straw. Iodine is less effective at lower temperatures but no instructions are included for low temperature operation.

CREATE AN ASSESSMENT TOOL EXERCISE
Background Information

There are basically 4 methods for treating water suspected of containing microbiological pollutants when traveling.

Boiling

The simplest and most effective method for purifying water is boiling. Boiling water for 10 to 20 minutes will kill the vast majority of bacteria, protozoa and viruses. The only problems with boiling are that it can be inconvenient, requires a stove with extra fuel, and will not remove suspended particles so that the water may still look cloudy. Boiling water over a camp fire can be difficult even when dry wood can be found and regulations permit camp fires.

Chemical Treatment

The second method involves the use of chemicals to kill biological organisms. Iodine and chlorine are commonly used. Iodine is best because chlorine does not kill all protozoa and is less effective in cold water. Iodine kills most protozoa, bacteria and viruses. The disadvantages of iodine are that it is not recommended for long term use (iodine is toxic) and some people are allergic to iodine. Iodine can also be harmful to people with thyroid conditions and to unborn babies. Iodine also leaves a distinctive unpleasant taste in the water.

Microfiltration

The third method involves microfiltration down to .2 microns. This removes most protozoa and bacteria from the water but does not remove viruses. Some filters use carbon membranes which also remove other chemical pollutants. These devices are not recommended when the temperature will remain below freezing because the filter membranes may freeze and crack.

Purifiers

Another method involves a process known as water purification. These devices usually resemble filters but only remove some of the larger microbiological organisms. The remaining organisms are killed by iodine in the filter. These devices are not recommended when the temperature will remain below freezing because the filter membranes may freeze and crack.

CREATE AN ASSESSMENT TOOL EXERCISE
Background Information

Protozoans such as Giardia and Cryptosporidia range in size from 3 to 15 microns in size. These pollutants can cause severe diarrhea and vomiting in certain individuals. Some individuals are relatively immune to the effects of these pollutants. Protozoans such as Giardia can be found in 90% of the lakes, rivers and streams in the US.

Bacteria such as E. Coli range in size from .2 to 10 microns. Bacteria such as E. Coli can cause severe diarrhea and vomiting. These pollutants can be fatal for people with weak immune systems and for young children. Bacteria are commonly found in all surface water (lakes, streams and rivers).

Viruses such as Hepatitis range in size from .004 to .1 microns . While some viruses produce symptoms similar to Giardia, others can lead to more serious problems, or even death. Viruses are not common in North American lakes and streams unless they have been contaminated by raw sewage during flooding. Viruses are more commonly found in less developed countries like Mexico where there are inadequate sewage treatment facilities.

Chemical pollutants such as pesticides, and manufacturing waste products can be toxic if they occur in high concentrations. These pollutants are usually only found in high concentrations in water fed by factory and farm drainage.

IDEAL PROBLEM NAVIGATION GUIDE
Part 4

Anticipate the outcomes of using the strategies you explored in the last take home exercise.

Strategy ____________________

Possible Positive Outcomes	Possible Negative Outcomes

Strategy ____________________

Possible Positive Outcomes	Possible Negative Outcomes

Strategy ____________________

Possible Positive Outcomes	Possible Negative Outcomes

Strategy ____________________

Possible Positive Outcomes	Possible Negative Outcomes

Strategy ____________________

Possible Positive Outcomes	Possible Negative Outcomes

Strategy ____________________

Possible Positive Outcomes	Possible Negative Outcomes

LEARNING STRATEGIES ASSESSMENT EXERCISE

Why

The assessment inventory helps participants identify their own strengths and weaknesses in learning skills. This information can be used by individuals or groups to focus attention on areas where they may need improvement.

Who

This activity is suitable for all groups

Time Required

This exercise should take from 15-25 minutes.

Supplies Required

Pens or Pencils
Copies of the Learning Strategies Inventories worksheets for each participant
Copies of the information sheets used in each of the two previous sessions

LEARNING STRATEGIES ASSESSMENT EXERCISE
Directions

How

Hand out copies of the Learning Strategies Assessment Inventory. Announce to the group.

1. "We would like you to evaluate your own learning skills in the areas below. Think about your skills in terms of strengths and weaknesses when you fill in the worksheet."
2. "Try to clarify the negative consequences of each deficient skill and think of ways to improve that learning skill."

Additional Directions

For participants with English reading levels below sixth grade

1. If your group consists of people with mixed abilities but at least half can read English at the sixth grade level, you can have the students work in pairs. Each pair should consist of one person who has difficulty reading the information and one person who does not. They should then work together to complete the inventory.

2. If your group consists of predominantly individuals who read English below the fifth grade level, you may want to make an overhead of the inventory. As you read each item and possible responses, show the locations on the form and give the participants time to mark their answers.

LEARNING STRATEGIES ASSESSMENT EXERCISE
Inventory

Rate your own skills in the areas below

Learning Strategy/Skill	Rating: Good, Fair, or Poor	Negative Consequences	How to Improve
Using information presented orally by the trainer			
Using information presented in charts and tables			
Using information presented in text form			
Using information presented in Pictures and Diagrams			
Using mathematical information			
Effectively organized the new information			
Identified all relevant information			
Ignored all irrelevant information			

MODULE 8

Effective Communication

In this module we focus on communication skills. How can we get our ideas across with clarity? And how can we tell if we are adequately prepared for the presentation we are about to make?

It is important to help people realize that their communication goal always involves at least three subgoals: a message (e.g., they have something important to contribute), an audience (e.g., a prospective employer or someone else), and a presentation medium (e.g., personal interview, letter, group presentation). These three subgoals can be remembered by thinking of the acronym "MAP" (message, audience, presentation medium).

Goals

- Communication Strategies
- Speaking Skills
- Cross Cultural Communication
- Group learning & cooperation
- Writing Skills

Exercise & Resource Options for Module 8

Resource#	Name	Purpose
H1	Role Playing	Explore common communication problems
H2	MAP Exercise	Prepare for their own Presentations
H3*	Assessment	Evaluate Workshop

Module 8: Effective Communication

1. Overview and Last Time

Last time we focused on the Anticipate component of IDEAL and applied it to the goal of anticipating whether we were adequately prepared for an interview or a test. In this lesson we focus on skills of communication. How can we get our ideas across with clarity? And how can we tell if we are adequately prepared for the presentation we are supposed to make?

Once a communication problem has been identified (e.g. you discover that you have an interview tomorrow), it is important to define your communication goals. For example, if you are applying for a new position in your company, your communication goal may be to convince the interviewers that you have something important to contribute to the organization. It is also important to realize that your communication goal always involves a message (e.g., you have something important to contribute), an audience (e.g., the prospective employer), and a presentation medium (e.g., personal interview, letter, group presentation). We will explore these three subgoals represented by the acronym "MAP" (message, audience, presentation medium) in the first exercise.

Failure to consider each of these crucial components to your communication goal can frustrate your overall attempts to communicate. For example, imagine trying to convince a prospective employer that you are easy to get along by using a communication strategy that you might use with a friend, such as inviting her to a party. The prospective employer might misunderstand the message and think that you are trying to curry favors to cover out for a lack of skill.. It is important to remember that how you define each of the preceding subgoals (thinking about your message, audience, presentation medium)can influence the strategies you use for communication. In the second exercise we will explore some common communication problems.

2. Role Playing Some Common Communication Errors.

In this exercise, participants role play some common communication problems while attempting to teach cross cultural communication. This is a fun exercise that can also be very instructive and help people learn to identify common problems that they themselves might have.

3. Presenting Ideas About their Own Projects

In this exercise participants are helped to think through issues associated with the acronym MAP (message, audience, presentation medium). After they do so, it is good for them to attempt to discuss their ideas and problems with one another. Members of the group can help one another improve their communication skills.

4. Summary and What's Next

The purpose of this lesson was to help people learn to communicate their ideas more effectively. A role playing exercise was used to help people identify common problems with many presentations. The acronym MAP was used to help people think of three areas that are especially important for planning their communication: Message, audience, and presentation medium). Learning about each of these areas is extremely important for communication skills.

Next time the goal is to "put everything together". This can take a variety of forms. First, members of the group might want to give presentations about the problems they chose to work on and the progress they have made. Second, members of the group may want to share some of their personal insights as they want through the workshop. Third, members may want to discuss ways to make the workshop even better the next time. They might choose to "leave a legacy" of tips, insights, suggestions for new problems, stories about their own problem solving and so forth that can be useful to others. These can be published, with people acknowledged as authors, as part of "resources" and used the next time the workshop is taught.

ROLE PLAYING EXERCISE

Why

There are a variety of common mistakes that people make when communicating. This exercise is designed to help people understand and experience some of those mistakes so that they can better anticipate and avoid similar problems in their own presentations. The participants will also learn about some interesting problems in cross cultural communication.

Who

These exercises can work for any size group.

Time Required

This exercise should take approximately 30-45 minutes.

Supplies Required

Cross-Cultural Communications Handouts

ROLE PLAYING DIRECTIONS

1. Divide the participants into groups of six or less. (For groups with less than six members, distribute as many roles as there are group members.)
2. Give a different role to each member of the group.
3. Instruct the participants that they should read over the cross-cultural communications handout and be prepared to give a short presentation to their group. They should follow any instructions on the handout.
4. After they have taught the information according to the roles they were given, the group should briefly discuss the problems that they had with the presentation.
5. The individual should then reveal their role assignment.

ROLE PLAYING EXERCISE

Role 1

You refuse to look at your audience and just read your material in a very boring way. Present the information below.

The task of creating messages appropriate for an audience can be especially difficult when we try to communicate with members of different cultures or subcultures. Since most of us tend to take our cultural knowledge for granted, we frequently fail to realize that others may not share our view of the world. For example, when researchers presented Americans and natives of India with written descriptions of an American wedding and an Indian wedding, people frequently misinterpreted aspects of the other culture's ceremony. For example, the description of the American wedding included information that the bride wore "something old, something new, something borrowed, and something blue." The Americans realized this was part of a tradition, but many of the Indians interpreted it differently. They felt sorry for the bride because she had to borrow things and had to wear clothes that were old.

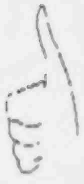
Cross-cultural communication is often a problem for companies doing business in foreign lands. For example, an article in *The Wall Street Journal* described an incident in which a United States firm asked its Japanese distributor to advertise a new product. The Japanese distributor answered in the affirmative. A year later the owner of the United States firm found that not a single advertisement had been placed. He later realized that saying yes in Japan does not necessary mean, "Yes, I will do it." Instead, it often means, "Yes, I understand."

Many attempts to communicate involve nonverbal as well as verbal messages. Like verbal messages, nonverbal messages can also be misinterpreted across cultures. For instance, patterns of eye contact can have different implications for communication. In America, it is generally considered important to "look people in the eye." If, when meeting an American, you glance at his or her eyes and then quickly look elsewhere, you will frequently be perceived as unsure of yourself or perhaps rude. In other cultures, however, direct eye contact can have other meanings. For example, in some Native American Indian tribes young children are taught that it is disrespectful to look an elder in the eye. What is viewed as a compliment in one culture can be seen as an insult in another. When dealing with multi-cultural audiences it is important to know the meaning that your body language may have to members of these other cultures.

ROLE PLAYING EXERCISE

Role 2

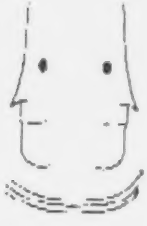
When you talk use distracting words such as "uh", "you know", and "um" over and over throughout your talk. Present the information below.



U.S. typical meaning:
hitchhiking: things are going good

Cross Cultural Meanings:
In German bars, this will get you one beer;
In Japanese bars, you may get five.
In Nigeria, you may be beaten by motorists.

Behavior: holding thumb up



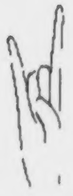
Behavior: moving head from side to side
U.S. typical meaning: no

Cross-cultural meanings:
In Bulgaria, Turkey, Iran & Bengal, you've said "yes".
In India, you've said, "yes, I am listening."

ROLE PLAYING EXERCISE

Role 3

Your visual aids are too small, too messy, or unreadable for some other reason. Present the information below.



Behavior: fist raised with little finger and index finger extended

U.S. typical meaning:
University of Texas fan

Cross-cultural meanings:
In Africa, "You are cursed."
In Brazil and Venezuela, "You can ward off evil."
In Italy, "Your spouse is unfaithful."

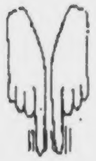
Behavior: looking down

U.S. typical meaning: shy or weak

Cross-cultural meanings:
In Japan & Korea, it is a sign of respect.

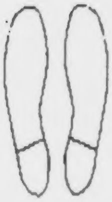
ROLE PLAYING EXERCISE
Role 4

You give your audience no relevant information. You talk about everything except the subject. Present the following information.



Behavior: tapping forefingers together
U.S. typical meaning: "like a bug?"

Cross-cultural meaning:
In Egypt, "How would you like to sleep with me?"



U.S. typical meaning:
stretching your legs

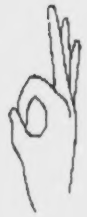
Cross-cultural meaning:
In Saudi Arabia, Egypt, Singapore, & Thailand, you've insulted people by comparing them to the lowest, dirtiest part of your body.

Behavior: showing the bottom of your shoe

ROLE PLAYING EXERCISE

Role 6

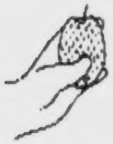
You give your audience too much information, too fast. Present the following information.



Behavior: making a circle with the forefinger and thumb.

U.S. typical meaning: "O.K." or "Good job."

Cross-cultural meanings:
In France, you've suggested "worthlessness."
In Japan, you've signaled "coins."
In Malta, Sardinia, Turkey, Greece, & Italy, you have suggested female body parts.



Behavior: Passing food with the left hand.

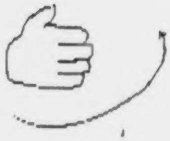
U.S. typical meaning: being generous

Cross-cultural meanings: In the Middle East, one avoids touching food with the left hand, "the unclean one."

ROLE PLAYING EXERCISE

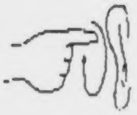
Role 6

When you talk you distract your audience by not being able to stand still. You shift from one foot to the other. You either twirl your hair or put on and off a cap, play with keys, etc. Present the following information.



Behavior: wiping the edge of your hand on a surface
U.S. typical meaning: "the table is dirty"

Cross-cultural meanings:
In Latin America, "Someone is stealing!"
In Peru, " Pay me now!"



Behavior: rotating forefinger around ear
U.S. typical meaning: "You're crazy!"

Cross-cultural meaning:
In Argentina, "You have a phone call."

MAP EXERCISE

Why

This exercise will help prepare the participants for their final project presentations. Although they should have worked through the IDEAL Navigation Guide for their own problem by now, they really haven't considered how to communicate their ideas to others. In this exercise they will clearly define their communication goals and explore possible strategies that may help them be more effective communicators.

There are really three subgoals in any communication problem. These goals include the **message** you are trying to communicate, the nature of the **audience**, and the presentation **medium** (oral, written, video, etc.). We use the acronym "MAP" to represent these three interrelated subgoals. In this exercise, the participants will try to clearly define these goals for their own project and explore strategies that may help them achieve these goals.

Who

These exercises can work for any size group.

Time Required

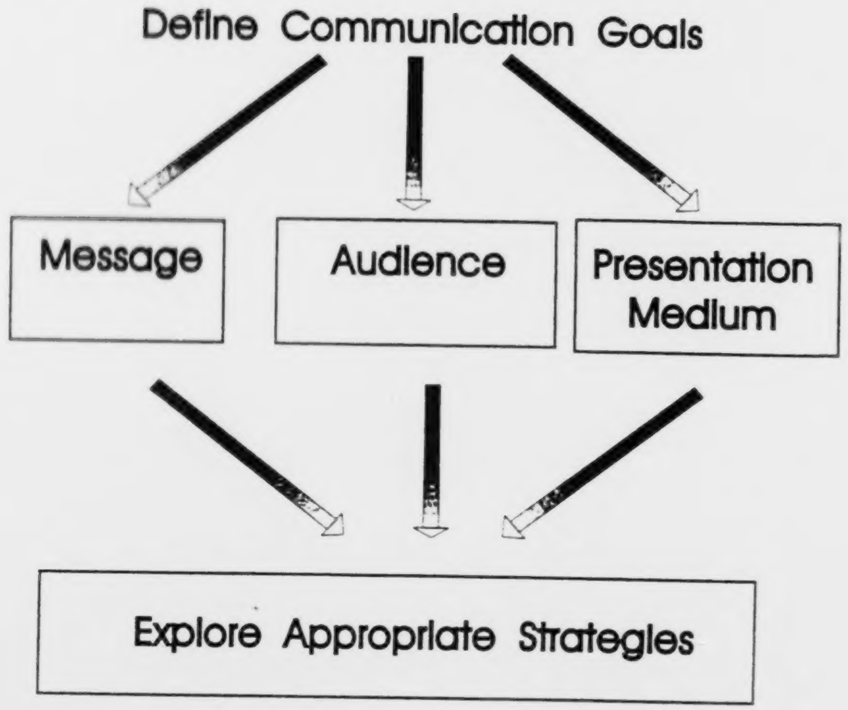
This exercise should take approximately 20 -35 minutes.

Supplies Required

Pens or Pencils
Completed IDEAL Navigation Guide
Map Exercise Forms

MAP EXERCISE DIRECTIONS

1. Explain the importance of clearly defining communication subgoals represented by the acronym MAP. You can make an overhead of the MAP Figure.
2. You should lead a short discussion about how characteristics of the audience may change the strategies you use for communication.
3. Distribute the MAP exercise forms and ask each participant to take out their completed IDEAL Navigation Guide.
4. Ask the participants to fill in the MAP forms.
5. Allow students to complete the MAP exercise and then review each others ideas.



Define Communication Goals

Message

Audience

Presentation Medium

Explore Appropriate Strategies

MAP EXERCISE

MESSAGE

Most people value presentations that provide a clear and concise statement of the key ideas. List here the main ideas that you wish communicate.

1. The Problem:

   ____

   ____

2. Your Goal:

   ____

   ____

3. The Solution:

   ____

   ____

4. The Benefits:

   ____

   ____

AUDIENCE

Describe the characteristics of your audience. Different communication strategies may be necessary depending on the knowledge, interests, attitudes, and customs of the people you plan to address.

1. age_____
2. education level _______
3. number of people in audience _______
4. How familiar are they with your topic______
5. List all cultures represented

   ____

6. Other important characteristics of your audience

   ____

7. List any technical terms or ideas that may be unclear to your audience

   ____

PRESENTATION MEDIUM

The presentation medium you plan to use when presenting your message (such as an oral presentation, a written presentation, a video presentation, or an interactive multi-media presentation.

Presentation Medium ________________________

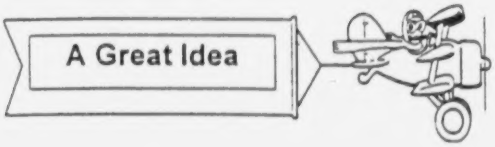
COMMUNICATION STRATEGIES

Try to anticipate the positive and negative consequences of using each type of strategy below in your project.

Strategy	Describe Specifics	Positive Consequences	Negative Consequences
A list of the main points			
Illustrations or charts			
Examples			
Humor			
Analogies (similar situations)			

MODULE 9

Putting It All Together



Looking Back at the Effects and Learning Together

The purpose of this session is to give the participants some experience sharing their ideas with others. Hopefully, they will incorporate information from the previous session on communication strategies to make their presentations more effective. The presentations also help the participants see how everything in the workshop ties together in a single real world problem. If time permits, the participants can help each other evaluate their attempts to solve a novel problem.

The ideas that are shared can take a variety of forms. Firsts members of the group might want to give presentations about the problems they chose to work on and the progress they have made. Second, members of the group may want to share some of their personal insights as they went through the workshop. Third, the participants will also complete a survey to see how much progress they have made on relevant skills. It is important for both the participants and the trainers to understand what skills the workshop is having a positive effect on and what areas need more attention. Fourth, members may want to discuss ways to make the workshop even better the next time. Finally, each participant should receive a certificate of completion to acknowledge their effort and progress.

Goals

- Public Speaking Skills
- Listening Skills
- Evaluating Progress
- Look Back & Learn
- Practical Real World Problem Solving
- Communication Skills

Exercise and Resource Options for Module 9

Resource#	Name	Purpose
I1	Presentation Exercise	Show how to apply IDEAL to a real world problem
I2	Progress Inventory	Evaluate Workshop
I3	Leaving a Legacy	Suggestions for Future Workshops
I4	Wrap Up	Acknowledge Achievement

Module 9: Putting it All Together:

Looking at Effects and Helping Ourselves and Others Learn

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The participants will also complete a survey to see how much progress they have made on relevant skills. It is important for both the participants and the trainers to understand what skills the workshop is having a positive effect on and what areas need more attention.

Each participant should receive a certificate of completion to acknowledge effort and progress.

PRESENTATION EXERCISE

Why

This exercise is designed to give the participants the opportunity to share their own ideas with others in the class. Hopefully, they will demonstrate how the skills learned in this workshop can be applied to real world problems.

Presentation skills are becoming increasingly important as our society becomes more information based. There are many great ideas that were never implemented because people were unable to convince others that their idea was worth acting on. This exercise will give people practical experience communicating ideas that could have an impact on themselves and others around them. Sharing our ideas with others is also a good way to get feedback and suggestions that can help us refine our ideas.

Who

Version A	Version B
This version is best for groups of 6 or less.	This version is suitable for groups of 7 or more.

Time Required

This exercise should take approximately one hour.

Supplies Required

This will depend upon the needs of the presenters.

PRESENTATION DIRECTIONS

VERSION A

1. Each person should make about an 8-12 minute presentation on their problem and include the problem that they identified, their goals, strategies they explored, anticipated outcomes, and a plan of action for the future. This presentation will be made to the entire group.
2. After each presentation, participants should be encouraged to ask questions and make constructive suggestions for improvement.

VERSION B

1. You should divide the participants into groups of approximately six individuals. Then proceed with directions for Version A except the participants will present to their smaller group instead of to all workshop participants.

PROGRESS EVALUATION

Why

It is important to recognize that we are making progress in improving our skills. It is also important to recognize which areas which we need to continue to work on. Therefore, we should all take time out to see how we are doing and to ask ourselves are the strategies which we are using working.

Who

This activity is suitable for all size groups.

Time Required

This exercise should take from 5-10 minutes.

Supplies Required

Pens or Pencils
Copies of the Progress Inventory Worksheet for each participant

Progress Inventory Directions

How

1. Hand out copies of the Progress Inventory Worksheet. Also, each individual will need a pencil or a pen.
2. Announce to the group.

   "We would like to know how much progress you have made in each of the following skills."

Additional Directions

For participants with English reading levels below sixth grade

1. If your group consists of people with mixed abilities but at least half can read English at the sixth grade level, you can have the students work in pairs. Each pair should consist of one person who has difficulty reading the information and one person who does not. They should then work together to complete the inventory. **Note: Participants should be told that they should complete a separate evaluation for each individual.**

2. If your group consists of predominantly individuals who read English below the fifth grade level, you may want to make an overhead of the inventory. As you read each item and possible responses, show the locations on the form and give the participants time to mark their answers.

Progress Inventory

Rate how much you think your skills have improved in the areas below

Skill Area	Large Improvement	Moderate Improvement	Some Improvement	Slight Improvement	No Improvement
Problem Solving					
Learning new Information					
Communication					
Group cooperation					
Creativity					
Math					
Reading					
Memory					
Studying					
Finding Relevant information					

LEAVING A LEGACY

Why

This exercise is designed to give the participants the opportunity to share their own ideas with future workshop participants. Everyone has valuable ideas to contribute and everyone can benefit from information shared by others.

Who

This exercise is suitable for all size groups.

Time Required

This exercise should take approximately 15 minutes.

Supplies Required

Paper
Pen or pencils

LEAVING A LEGACY DIRECTIONS

1. Pass out pens or pencils and paper.
2. Have participants write a legacy for future participants. They might choose to leave a legacy of tips, insights, suggestions for new problems, stories about their own problem solving and so forth that can be useful to others. These can be published, with people acknowledged as authors, as part of our "resources" and used the next time the workshop is taught.

WRAPPING IT UP

Why

The purpose of this part of the workshop is to reward the individuals for their participation and effort. It is also important to bring closure to workshops.

Many of the workshop participants may have become friends. The closure party can provide an opportunity for them to interact and exchange numbers and addresses for continued contact and support.

Who

This activity is suitable for all size groups.

Time Required

This exercise should take from 5-45 minutes.

Supplies Required

Certificates of Completion
Party Supplies (optional)

Wrapping It Up Directions

How

1. You should have a graduation ceremony. This can be as simple or complex as you would like.
2. Call out each individuals name and have them come to the front of the room to receive their diploma.
3. If possible, it may be a good idea to get someone as high up in the company as possible to hand out the certificates. This will make it seem more important.

Additional Directions

If time allows, you may want to have a party after the ceremony complete with refreshments. This will make everyone feel more appreciated. Also, many of the workshop participants may have become friends. The closure party can provide an opportunity for them to interact and exchange numbers and addresses for continued contact and support.

CERTIFICATE OF ACHIEVEMENT

This certifies that

____

has successfully completed the

IDEAL Workplace

Training Workshop

____
Signature

____
Date

USING ABBREVIATIONS

Abbreviations are shortened forms of words. Abbreviations are usually followed by a period. Exceptions to this are government agencies known by their abbreviations, such as FBI (Federal Bureau of Investigation), TVA (Tennessee Valley Authority), and FDIC (Federal Deposit Insurance Corporation). Study carefully the following frequently used abbreviations:

Mister--Mr.

Mistress--Mrs.

before Christ (in dates)--B.C.

in the year of our Lord (in dates)--A.D.

Doctor of Medicine--M.D.

Junior (after a man's name)--Jr.

Senior (after a man's name)--Sr.

cash on delivery--C.O.D.

doctor--Dr. Reverend--Rev.

department--dept

superintendent--supt.

free on board--F.O.B.

foot or feet--ft.

inch or inches--in.

Doctor of Philosophy--Ph.D.

for example--e.g.

that is--i.e.

postscript--P.S. (for information you wish to include after you have finished a letter)

Company--Co.

Now, try your hand at converting the following to the appropriate abbreviations.

1. inch: _________ 2. department: _________ 3. feet: ______ 4. before Christ: __________

5, superintendent: ________ 6. Mister: ______ 7. Doctor: ______ 8. Mistress: _______

9. postscript: ______ 10. Junior: _____ 11, Senior: ___ 12. in the year of our Lord: ______

13. cash on delivery: ________ 14. Doctor of Medicine: ______ 15. Reverend: ______

16. free on board: _______ 17. Doctor of Philosophy: _______ 18. for example: ______

19. that is: _______ 20. Company: _____

KEY TO EXERCISE ON USING ABBREVIATIONS

1. in.
2. dept.
3. ft.
4. B.C.
5. supt.
6. Mr.
7. Dr.
8. Mrs.
9. P.S.
10. Jr.
11, Sr.
12. A.D.
13. C.O.D.
14. M. D.
15. Rev.
16. F.O.B.
17. Ph. D.
18. e.g.
19. i.e.
20. Co.

COMMAS IN COMPOUND SENTENCES

A comma is used to connect two complete sentences joined by the coordinating conjunctions and, but, or, for, nor, so, and yet. See the examples below. EXAMPLES:

I left for work this morning at seven o'clock, and I left work at four o'clock this evening.

I overslept this morning, because my alarm clock was not set, but I still managed to get to work on time.

You can register for the course " Major Themes in American Literature," or you can register for "Major Themes in British Literature."

I vote in every single election that is held, for I believe that doing so is every citizen's responsibility.

I do not believe in violence, nor do I believe in any kind of disrespectful behavior toward others.

James developed a love of reading as a young child, so he has always been an avid reader.

Maria was well aware of all the crime and violence in the world, yet she still maintained that most people were good, kind people.

Note that you do not use a comma before a coordinating conjunction that joins parts of a compound predicate. (A compound predicate has two verbs, but only one subject.) If you are not sure whether you have a compound sentence or a compound predicate, try this test: Cover up the coordinating conjunction, and read what is on either side of the conjunction separately. If both sides are sentences or consist of a complete thought, then you have a compound sentence, and a comma is necessary.

If only one side is a complete thought, then you have a compound predicate; thus, no comma is required. Note the following examples: EXAMPLES:

Mr. Millard Marcos was the Plant Manager at 2-M, and Merrill Moosewood was his employee who gave Mr. Marcos suggestions concerning plant safety. (Compound sentence requiring a comma)

Juan entered the room quietly and sat down without saying a word. (Compound predicate--no comma needed)

Also, note that if the independent clauses (sentences) are quite short that no comma is necessary. EXAMPLE I loved my haircut and I told the stylist so. Now, apply this knowledge to the sentences below. If no comma is needed, simply put N.

1. The workday seemed particularly long today and I am very anxious for quitting time to come.

2. Roberto is very intelligent and has an excellent sense of humor.

3. Often we work with people we do not particularly like but we must work with them anyway.

4. Life is short and each day is precious.

5. Nancy made very good grades in school for she was an extremely conscientious student.

6. I was rather late arriving at the party but I still had a very good time.

7. The Louisiana Purchase cost the United States fifteen million dollars so it was an amazing bargain as real estate goes.

8. The United States is not a perfect country yet it is, nevertheless, a wonderful country in which to live.

9. At the slumber parrty, the teenage girls talked all night and ate pizza.

10. You can pay for the purchase now or you may pay on the installment plan.

KEY TO EXERCISE ON COMMAS IN COMPOUND SENTENCES

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10. You can pay for the purchase now, or you may pay on the installment plan.

WORDS THAT ARE FREQUENTLY CONFUSED

Note that the following pairs of words are spelled differently and have different meanings, but are often confused with one another.

adapt--to adjust to a new situation or use.

adopt--to take into one's family as if one's own or to take in and use as one's own

complement--something that completes or brings to perfection.

compliment--an expression of praise or admiration

council--a body of people elected as a legislative group or as an advisory.

counsel--advice or guidance or a lawyer or lawyers giving legal advice.

respectfully--in a manner showing esteem or honor.

respectively--one by one in the order given or mentioned

stature--the height of a person or a level achieved; status.

statute--a law enacted by a legislative body.

Now, use these words correctly in the following sentences. (Don't forget to make the verbs past tense when necessary!) adapt, adopt

1. The couple ____________ the Rumanian baby after flying to Rumania to see the infant.

2. The baby has _______________ well to its new environment. complement, compliment

3 That blue dress really ___________________ your eye color.

4. Cynthia _________________________ her on her recent weight loss. council, counsel

5. Obviously, O. J. Simpson had excellent legal _______________.

6. The ________________ passed a resolution supporting the mayor's new school plan respectfully, respectively

7. One's teachers should always be treated __________________.

8. The first three United States Presidents were George Washington, John Adams, and Thomas Jefferson, _____________________. stature, statute

KEY TO EXERCISE ON WORDS FREQUENTLY CONFUSED

1. adopted
2. adapted
3. complements
4. complimented
5. counsel
6. council
7. respectfully
8. respectively
9. statutes
10. stature

VOCABULARY:

FILL IN THE BLANKS

Fill in the blanks in the sentences below with the words below.

cancelled
contingency
pinpoint
safety
morale
commandeered
innocently
motive
site
goggles
conscientious
shift
fisticuffs
prodigal
solicitors

1. Although the police have arrested the suspect, they have yet to determine his ____________ for murdering the victim.

2. The meeting was ______________ because of the illness of the supervisor who was to conduct the meeting.

3. The ________ of the new building has yet to be decided.

4. Many people resent being disturbed by telephone ___________________ when they are at home.

5. Before deciding on a solution to the problem, it is often necessary to _______________ the exact nature of the problem.

6. Most employers, of course, want employees who are quite ______________________ about their work.

7. The argument became so heated that the men engaged in __________________.

8. Jobs which involve flying particles or debris, such as drilling or sanding, usually require the wearing of ________________.

9. Many companies have frequent meetings or programs concerning ______________ because they are so concerned with preventing injuries on the job.

10. His spending habits were so __________________ that he was forced to declare bankruptcy.

11 When coming up with any long-range business plan, one should provide for any ____________________ that might possibly occur.

12. The law enforcement officer ______________________ the citizen's car in order to pursue the suspect.

13. When employees suffer from low _____________, their effectiveness as workers obviously suffers also.

KEY TO VOCABULARY:

FILL IN THE BLANKS

1. motive
2. cancelled
3. site
4. solicitors
5. pinpoint
6. conscientious
7. fisticuffs
8. goggles
9. safety
10. prodigal
11. contingency
12. commandeered
13. morale
14. shift
15. innocently

PROBLEMS WITH MODIFIERS

A problem that occurs with modifiers is confusing adjectives with adverbs. The typical error is using an adjective when an adverb is needed. Adjectives modify or describe nouns and pronouns; they answer the following questions in relation to the nouns and pronouns they modify:

What kind?

Which one(s)?

How many or how much?

Note the following examples:

The actor is a tall, handsome man. (What kind of man?)

That man standing over there is my father. (Which man?)

The football player ate seven slices of pizza. (How many slices?)

The stiudents were assigned little homework today. (How much homework?)

Adverbs modify verbs, adjectives, and other adverbs. They answer the following questions in relation to these three parts of speech: When? Where? How? To what extent? Note the following examples:

I will see you tomorrow. (See you when?--tomorrow modifying the verb see)

It is cool outside. (cool where--outside modifying the adjective cool)

Tiger Woods plays golf well. (plays how--well modifying the verb plays)

It was quite hot in the gym yesterday. (To what extent is it hot?--quite modifying the adjective hot)

He speaks very rapidly. (To what extent rapidly?--very modifying the adverb rapidly)

Note that adverbs often end in -ly. Also, note that good is an adjective whereas well is an adverb except when it relates to health: I don't feel well today (well is an adjective here). However, President Clinton speaks well. Here, well is an adverb telling how President Clinton speaks (well modifying speaks) Study carefully the examples given. Then, try the exercise below, choosing the correct adjective or adverb..

1. I am (real, really) tired today.

2. His voice sounds quite (good, well).

3. We walked home (slow, slowly) after the football game.

4. Robert played his part in the play (perfect, perfectly).

5. I am (sure, surely) glad to see you.

6. Drive (slow, slowly).

7. I can't hear you; please speak more (distinct, distinctly).

8. You cannot do (good, well) on tests if you do not get enough sleep.

9. With your new hairstyle, you look very (good, well).

10. The car careened (wild, wildly) after it hit a slick spot on the road.

KEY TO EXERCISE ON MODIFIERS

1. really
2. good
3. slowly
4. perfectly
5. surely
6. slowly
7. distinctly
8. well
9. good
10. wildly

VOCABULARY

_____1. site A requiring immediate attention

_____2. acquaintance B. a baby's or child's bed with high sides

_____3. pinpoint C. took by force; seized for public use

_____4. urgent D. to locate precisely

_____5. weekend E.. a person someone knows, but not intimately, as a friend

_____6. clue F. the place where something is located

_____7. stack G. freedom from risk or injury

_____8. commandeered H. a hint; anything that guides one to the solution of a mystery

_____9. crib I. a large, neat pile arranged in orderly layers

____10. safety J. from Friday evening to Sunday evening

VOCABULARY:

KEY

F 1. site

E 2. acquaintance

D 3. pinpoint

A 4. urgent

J 5. weekend

H 6. clue

I 7. stack

C 8. commandeered

B 9. crib

G 10. safety

VOCABULARY

_____1. emporium A. treated like a baby; pampered

_____2. goggles B. having to do with the human mind or psyche

_____3. detected C. a card used in fortunetelling

_____4. conscientious D. a large store selling a variety of merchandise

_____5. seminar E. an accidental series of events

_____6. psychic F. a pair of large spectacles with sidepieces to protect the eyes

_____7. coincidence G. persons who sell products or services or ask for contributions

_____8. coddled H. found out; discovered the existence of

_____9. solicitors I. a conference or meeting

____10. tarot J. careful; thorough

VOCABULARY:

KEY

D 1. emporium

F 2. goggles

H 3. detected

J 4. conscientious

I 5. seminar

B 6. psychic

E 7. coincidence

A 8. coddled

G 9. solicitors

C 10. tarot

WRITING A JOB DESCRIPTION

As you read in the episode "The Missing 2-M Man," Merrill Moosewood suggested to Plant Manager Millard Marcos that the Major Manufacturing Company, commonly referred to as "2-M," hire a Safety Officer. This person would be trained in First Aid procedures; we might further infer that this person would make sure that safety procedures were being implemented on the shift to which he/she was assigned, such as wearing safety goggles or operating heavy machinery correctly. Furthermore, we might also guess that this person be in charge of holding safety meetings with employees and implementing safety programs; for example, some companies offer safety prizes for employees working in areas where no injuries occur during a specified period of time. You might , if you so choose, ask that the Safety Officer have prior experience with another company in the safety area, such as a specified period of time. Based on these possibilities, write a job description for a Safety Officer.

JOB DESCRIPTION FOR SAFETY OFFICER

The Safety Officer for Major Manufacturing Corporation must______________________________

WRITING PARAGRAPHS

Remember that a paragraph must contain a main idea which is usually contained in a topic sentence. The topic sentence usually appears at or near the beginning of the paragraph. Paragraphs achieve unity when each sentence supports the main idea. Write a paragraph using the topic sentence provided for you. Keep in mind that each sentence that you write must relate to or support the main idea stated in the topic sentence.

One way to make a paragraph coherent is to use appropriate transitions. Transitions are words or phrases which link sentences within paragraphs. Since you are discussing things you can do to make your workplace safe, try to use a few of these transitions in your paragraph: first , second, third, next, and finally.

There are several things I can do on a daily basis on my job to help achieve safety in my workplace.

METHODS OF PARAGRAPH DEVELOPMENT

To write unified and coherent paragraphs, one can use various strategies of paragraph development. One method is to narrate a series of events. This simply means that you tell or discuss a series of events, usually in the order in which the events occurred. This is called chronological order. To provide unity in such a narration, you can use transitional words at the beginning of sentences such as first, second, next, then, and finally.

Suppose that you are responsible for providing for your employer an account of exactly how an accident or injury occurred on the job to one of your fellow employers. Think of a possible accident or injury that could easily happen in your workplace; it need not be complicated. In your paragraph, tell step by step what happened, concluding with the injury suffered by your colleague. Try to use some of the transitional words mentioned above.

WRITING A MEMO

Mr. Martin Mayo, on the advice of Inspector March, decides that he must call a meeting of all his employees, including the recently dismissed employees, to discuss possible layoffs or downsizing of Mudville Wham-Bats. The meeting is to be held on October 4, 1997 at 10:30 A.M. Thus, the memo is to be addressed to all employees of Mudville Wham-Bats from Martin Mayo, CEO; the subject is a meeting to discuss downsizing the company. The time and date are given above. A brief statement tells the employees that Martin Mayo wishes to discuss alternatives solutions to downsizing that will enable him to reinstate some of the recently dismissed employees and provide fair treatment, including a compensation package, for any employees that the group decides must be laid off for the good of the company.

(Remember that "RE" introduces the subject of the memo.)

MEMO

TO:

FROM:

RE:

TIME:

[Brief Statement]

TAKING NOTES AT A MEETING

You have been asked by Mr. Martin Mayo, CEO of Mudville Wham-Bats, to take notes at the meeting he has called to discuss possible cuts in the company. Mr. Mayo wants to be certain that he can remember correctly the decisions made at the meeting.

By referring to the episode, you can see that various suggestions were made by the employees; the final decision was that only thirty people needed to be laid off, most of them in manufacturing and shipping. Agreement was reached on a severance package; furthermore, the promise was made by Mr. Martin Mayo that when business improved at the company they would be rehired.

Write a brief paragraph recording these facts.

MAKING VERBS AGREE WITH THEIR SUBJECTS

Remember that a verb must agree with its subject in person (first, second, and third). A verb shows action, mental or physical, or state of being. A verb must also agree with its subject in number: in other words, a singular subject requires a singular verb, and a plural subject takes a plural verb.

First person singular: I read several books a week.

First person plural: We read several books a week.

Second person (singular or plural): You read several books a week.

Third person singular: He (or she) reads several books a week.

Third person plural: They read several books a week. (Notice that it is the third person singular verb that requires -s on the end.)

When dealing with regular nouns, not pronouns, plural nouns that end in -s take a verb without an -s. Similarly, singular subjects take verbs that end in -s. Let's put it in a slightly simpler way: subject ends in -s, then the verb does not; subject does not have an -s, then the verb does. Look at the following examples:

The cat was playful.

The cats were playful.

The dancer performs her routine.

The dancers perform their routines.

SUBJECTS JOINED BY "AND" Two nouns joined by and take a plural verb.

Bill and Mary are here to help us. (not is)

Marilyn and I were good friends this year. (not was)

A package and a letter were in the mailbox. (not was)

However, if the two subjects are considered to be a unit, a singular verb is necessary.

Blackberry cobbler and ice cream is his favorite dessert. (not are)

Peanut butter and jelly is his favorite lunch. (not are)

My friend and colleague is to speak at the conference. (Notice that only one person is being referred to by these two nouns. The fact that "the" does not appear before the second noun is a clue that indicates reference to only one person.)

SUBJECTS JOINED BY "OR" When two subjects are joined by or, either...or, neither...nor, the verb must agree in number and person with the subject nearer to the verb.

Either cookies or ice cream is my favorite dessert. (verb agrees with ice cream)

But, Either ice cream or cookies are my favorite dessert. (verb agrees with cookies)

Remember to simply look for the noun just in front of the verb, and make the verb agree with that noun. Now, try to apply these rules in the sentences below. Take your time, and be sure to refer to the rules when you need to do so.

1. The counselor (advise, advises) the students.

2. The scientists (seem, seems) puzzled by the results of the experiment.

3. The football team and the school band (was, were) on the football field at the same time.

4. Neither the basket nor the peaches (was, were) expensive.

5. He frequently (sing, sings) at weddings and other events.

6. Shirley and Lenore (share, shares) many interests.

7. Either Ron or Doris (write, writes) to us frequently from Delaware.

8. The economy (influence, influences) the way people vote.

9. Some shingles on the roof (is,are) loose.

10. You (is, are) our first choice for president.

11. Sheila (doesn't, don't) like thunderstorms.

12. Exercise and a good diet (is, are) necessary for good health.

13. They (does, do) many things together as a family.

14. Either steaks or chicken (is, are) going to be served at the dinner.

15. Neither the President nor the representatives (supports, support) the change in the bill.

MAKING SUBJECTS AGREE WITH VERBS

1. advises
2. seem
3. were
4. were
5. sings
6. share
7. writes
8. influences
9. are
10. are
11. doesn't
12. are
13. do
14. are
15. support

SOME USAGE PROBLEMS

Below are some common usage problems. Study them carefully before you attempt the exercise below.

among--Use when you are speaking of three or more (a group).

between--Use when you are speaking of only two.

amount of--Is followed by singular nouns.

number of--Is followed by plural nouns

can--refers to ability to do something.

may--is used when asking permission to do something.

disinterested--means impartial or lacking prejudice.

uninterested--means lacking in interest or indifferent.

emigrate from--One emigrates from one country to go to another.

immigrate to--To immigrate is to come into a different country to settle.

fewer--refers to people or objects that can be counted.

less--refers to amounts that can be seen or to abstract nouns.

imply--means to suggest without specifically stating.

infer--means to come to a conclusion based on evidence.

hanged--means specifically to put someone to death by hanging.

hung--is the past participle of hang.

Now, try the sentences below.

1. (Can, May) I go to the movie, Mom?

2. My ancestor (emigrated from, immigrated to) Scotland to America.

3. There were (fewer, less) than a thousand people at the concert last night.

4. The speaker (implied, inferred) that he was a supporter of the President.

5. The picture was (hanged, hung) in the hallway.

6. The movie was so boring that I was totally (disinterested, uninterested) after the first hour.

7. Many outlaws in the Old West were (hanged, hung) for their crimes.

8. I (implied, inferred) from the speaker's remarks that he was going to run for governor.

9. Mary (can, may) speak French quite well.

10. We are all entitled to a (disinterested, uninterested) jury of our peers when we have been accused of wrongdoing.

11. That recipe needs a little (fewer, less) salt.

12. My English ancestor (emigrated from, immigrated to) America in 1607.

KEY TO USAGE EXERCISE

1. May
2. emigrated from
3. fewer
4. implied
5. hung
6. uninterested
7. hanged
8. inferred
9. can
10. disinterested
11. less
12. immigrated to

VOCABULARY 1: MATCHING

_____1. miniature

_____2. staring

_____3. renowned

_____4, outlawed

_____5. sleuth

_____6. eccentric

_____7. gadgets

_____8. nonsense

_____9. marina

_____10. penthouse

A. a detective

B. behavior or language that is absurd or meaningless

C. small, specialized mechanical devices

D. looking at with a fixed gaze

E. a model or copy of something in a much smaller size

F. famous; widely honored and acclaimed

G. an enclosed area of harbor with moorings and docks for small boats

H a dwelling or residence on the top floor or the roof of an apartment building or other building

I . declared illegal; banned

J. an odd person; someone who deviates from the established norms of behavior

KEY TO VOCABULARY 1:

MATCHING

1. E.

2. D.

3. F.

4. I.

5. A.

6. J.

7. C.

8. B.

9. G.

10. H

VOCABULARY 2:

MATCHING

_____1. severance
_____2. gradual
_____3. unaminously
_____4. layoff
_____5. yacht
_____6. alimony
_____7. payroll
_____8. paranoia
_____9. custom
_____10. grievances
suspicion,

A. a list of employees receiving wages with the amount paid to each

B. a dismissal or suspension from employment

C. a habitual practice or routine

D. pertaining to money or benefits given to someone who who has been terminated as an employee

E. support given by a former spouse to a divorced person as ordered by a court

F. circumstances regarded as just cause for protest

G. having complete agreement or harmony

H. occurring in small stages

I. a relatively small boat with graceful lines used for racing pleasure cruises

J. a condition in which one shows unreasonable distrust, or an exaggerated sense of one's own importance

KEY TO VOCABULARY 2:

MATCHING

1. D.

2. H.

3. G.

4. B.

5. I.

6. E.

7. A.

8. J.

9. C.

10. B.

VOCABULARY 3:

MATCHING

_____1. boil

_____2. convinced

_____3. corporation

_____4. rude

_____5. relief

_____6. holiday

_____7. bursitis

_____8. ignore

_____9. humanity

_____10. mortgage
as
from

A. a day set aside by custom and/or the law to celebrate or commemorate a particular event

B. a painful inflammation of the bursa, a saclike body cavity located between joints, such as the shoulder, elbow or knee

C. kindness; mercy; being humane

D. to cause a liquid to reach the boiling point (212 degrees Fahrenheit); to vaporize a liquid by applying heat

E. ill-mannered; discourteous

F. a lessening or decrease of pain, anxiety, or discomfort

G. to refuse to pay attention to

H. persuaded; brought by argument and/or evidence to belief

I. a loan given by a creditor to a debtor in which property acts as security

J. a group of people granted a legal charter which recognizes them a legal entity having rights, privileges, and liabilities separate those of the individual members

KEY TO VOCABULARY 3:

MATCHING

1. D
2. H
3. J
4. E
5. F
6. A
7. B
8. G
9. C
10. I

VOCABULARY:

FILL IN THE BLANKS

humanity
codes
insensitive
severance
renowned
marina
log on
corporation
gradual
access
grievances
ignore
unaminously
mace
convinced

1. Mr. Soames was elected to the board of directors ________________; no one voted against him.

2. Often, to create a session on the computer, one must _____ ___, that is, enter a user word or password.

3. Most boat owners rent space at a ____________ in order to have somewhere to moor their boats.

4. It is unwise of any employee to ___________ safety rules.

5. After the Oklahoma City terrorist bombing, there was a widespread outpouring of _____________.

6. Many women carry a small can of _________ to protect themselves from potential attackers.

7. On some cars, one can gain _________ to the car by pushing a button on a remote control device.

8. Retired General Colin Powell became highly ___________ as a result of his leadership in the Gulf War.

9. The attorney became _____________ of his client's innocence after listening to his story.

10. IBM is a large, influential American __________________.

11. Juan broke his smoking habit at little at a time; it was a __________ process,

12. The employees of the Mudville Wham-Bats Company felt that they had legitimate _____________ against Mr. Martin Mayo.

13. Mr. Martin Mayo certainly exhibited rude and ________________ behavior toward his employees.

14. One morning the employees at Mudville Wham-Bats found that their access ________ didn't work when they tried to log on to their computers.

KEY TO VOCABULARY:

FILL IN THE BLANKS

1. unaminously

2. log on

3. marina

4. ignore

5. humanity

6. mace

7. access

8. renowned

9. convinced

10. corporation

11. gradual

12. grievances

13. insensitive

14. codes

15. severance

USING POSSESSIVES BEFORE A GERUND

A gerund is a verb form that is not used as a verb in a sentence. Instead, a gerund can function in any way that a noun can: as the subject of a sentence, a direct object, an indirect object, as object of a preposition, and as a predicate noun. Gerunds always end in -ing. To help you get familiar with gerunds, look at the following examples:

Reading is my favorite recreational activity. (Reading is the subject of the sentence.)

I find reading to be relaxing. (Reading is the direct object. A direct object always follows an action verb.)

My favorite recreational activity is reading. (Reading is the predicate noun; a predicate noun always follows a linking verb.

I never get tired of reading. (Reading is the object of the preposition of.)

One of the grammar rules which relates specifically to gerunds is that when using a noun or pronoun to modify a gerund, it is usually in the possessive case.

Possessive pronouns include the following: his, her, my, your, our, their, and its.

There are two exceptions: a plural noun which comes before a gerund is often not in the possessive case.

Example: Many teachers disapprove of students working part-time jobs after school.

Also, when the noun coming in front of the gerund is an abstract idea or an inanimate object, the noun is usually not possessive.

Example: The promoter blamed the ticket sales on the facility being inadequate.

Now, being trying to use possessives before gerunds yourself, study the following examples:

As your son's teacher, I disapprove of his coming in late. (Not him)
I am tired of her calling me every day on the telephone.
I am extremely irritated with its barking all night long.
The supervisor approved of Ms. Molloy's attending the conference.
The sponsor cautioned the cheerleaders about their spreading rumors.

Now, try your luck with the sentences below.

1. I appreciate (you, your) helping John with his math.
2. I was surprised by (Monica, Monica's) refusing your help.
3. (Mrs. Gray, Mrs. Gray's) excellent teaching is responsible for my lifelong love of history.
4. (Them, Their) bragging about their victory annoyed the losers.
5. I insist on (you, your) fulfilling your obligation as stated in the contract.
6. Did you know about (him, his) moving to Illinois?
7. (Him, His) running every day is very good for his health.
8. I find (you, your) whining to be quite immature.
9. I think (them, their) joking at such a tragic time to be inappropriate.
10. (Barbra Streisand, Barbra Streisand's) singing is quite wonderful.

KEY TO EXERCISE ON USING POSSESSIVES BEFORE GERUNDS

1. your

2. Monica's

3. Mrs. Gray's

4. Their

5. your

6. his

7. his

8. your

9. their

10. Barbra Streisand's

THE IDIOMATIC USE OF PREPOSITIONS

Many prepositions have acquired fixed, conventional uses when used with other parts of speech, especially verbs. In other words, when using certain verbs in a certain way they are followed by specific prepositions.. There are many of these idiomatic uses in the English language.

Here are a few of the ones most commonly encountered.

angry at or about something

angry with someone

deal in merchandise

deal with subjects

differ with someone differ about something

differ from something else

agree on or upon (come to a mutual understanding)

agree to (accept someone's idea or plan)

agree with (concur with someone or his idea)

correspond to (match; similarity)

correspond with (exchange letters)

Now, see how you do with the sentences below. Be sure to keep referring to the examples above.

1. This contract corresponds (to, with) the one I signed with your company last year.

2. I agree (on, to, with) you that the one on trial should have received a more severe punishment.

3. The J. C. Bradford Company and Merrill Lynch deal (in, with) stocks and bonds.

4. We differ (with, about, from) the issue of abortion.

5. I have corresponded (to, with) some friends in Delaware since graduate school.

6. This apartment differs (with, about, from) the one we looked at this morning.

7. We must all at times deal (to, with) the consequences of our behavior.

8. I differ (with, about, from) Jim when it comes to politics.

9. She is angry (about, with) her husband's excessive spending.

10. When you sign a contract, you are saying that you agree (on, to, with) the terms of the contract.

11. The mother was angry (at, with) her son about his school performance.

12. The architect and the company agreed (on, to, with) the blueprints for the new corporate headquarters.

KEY TO EXERCISE ON THE USE OF IDIOMATIC PREPOSITIONS

1. to
2. with
3. in
4. about
5. with
6. from
7. with
8. with
9. about
10. agree to
11. with
12. on

USING THE OBJECTIVE CASE OF PRONOUNS

The objective case of pronouns is used for any object in grammar: direct object, indirect object, and the object of the preposition. The direct object always follows an action verb and answers the question Whom or What in relation to the verb. We say that the direct object receives the action of the verb; in other words, the direct object is what is acted upon. Note the following examples:

We asked him to be our representative. (Asked whom? him)

Mrs. Crutchfield told her that she needed to study harder. (Told whom? her)

He told me that he was sorry for having been rude. (Told whom? me)

The teacher made them sit down until the bell rang. (Made whom? them)

My father took us to the movies frequently. (Took whom? us)

The indirect object answers To or For whom or To or For What after an action verb. Notice that to have an indirect object you must also have a direct object. Look at the following examples:

He sent me an E-mail message. (Sent to whom? me--message is the direct object)

I made him a solemn promise. (Made to whom? him--promise is the direct object)

I asked her a question. (Asked to whom? her--question is the direct object)

I mailed them a response. (Mailed to whom?--response is the direct object)

He promised us an answer soon. (Promised to whom? us--answer is the direct object)

*Note that you is the same in both the objective case and the nominative or subjective case, so you is not a problem when dealing with pronouns.

Finally, the objective pronouns are used as objects of the prepositions. Below is a list of common prepositions:

about, besides, inside, since, above, between, into, through, across, beyond, like, throughout, after, but, near, till, against, by, of, to, along, concerning, off, toward, among, despite, on, under, around, down, onto, underneath, at, during, out, until, before, except, outside, up, behind, excepting, over, upon, below, for, past, with, beneath, from, regarding, within, beside, in, round, without

Study this list carefully, as it is very important in grammar that you recognize prepositions. Then, look at the following examples of pronouns used as objects of prepositions.

I feel very positive about him as an employee. (about him)

The boss was waiting for her when she came in late. (for her)

Between you and me, this is strictly confidential. (Between you and me)

Only you know the real truth about us. (about us)

I am giving the responsibility to them. (to them)

As you have already no doubt noticed, the objective pronouns include him, her, me, them, and us. Now, try your hand at the sentences below.

1. He asked (she, her) to be his wife.

2. I wanted (they, them) to visit me in Tennessee.

3. Have lunch with (I, me) sometime this week.

4. He meant for (we, us) to be present during the meeting.

5. The gym teacher made (he, him) do fifty extra sit ups.

6. Ask (they, them) to make a contribution to the scholarship fund.

7. I stood there waiting for (she, her) to speak.

8. Make (he, him) stop talking, please!

9. Make (they, them) some coffee, would you?

10. They sent (we, us) a picture of their new baby.

KEY TO EXERCISE ON USING OBJECTIVE PRONOUNS

1. her

2. them

3. me

4. us

5. him

6. them

7. her

8. him

9. them

10. us

VOCABULARY 1:

MATCHING

_____1. clerical

_____2. battery

_____3. fortifying

_____4. disorienting

_____5. attire

_____6. languishing

_____7. coordinate

_____8. chef

_____9. memorize

_____10. vexing

A. fading; becoming weak; lingering

B. clothing

C. to work together harmoniously

D. a grouping of similar things to be used together

E. a cook, particularly one who is the head of a large kitchen staff

F. to learn by heart; commit to memory

G. giving physical strength; invigorating

H. having to do with clerks or office work

I. irritating; annoying

J. causing one to lose one's sense of direction or location

KEY TO VOCABULARY 1:

MATCHING

1. H.

2. D.

3. G.

4. J.

5. B.

6. A.

7. C.

8. E.

9. F.

10. I.

VOCABULARY 2:

MATCHING

_____1. napkin

_____2. charity

_____3. cramped

_____4. humiliating

_____5. nutritious

_____6. ordeal

_____7. observation

_____8. search

_____9. wontons

_____10. incense

A. a very difficult or painful experience that tests one's character or endurance

B. act of looking carefully in order to find something

C. a comment or remark

D. an act of good will

E. a Chinese dumpling filled with spicy, minced pork

F. a wood or gum that burns with a pleasant odor

G. embarrassing; humbling; causing disgrace

H. narrowed; not roomy or spacious

I. nourishing; aiding in the body's growth and development

J. a piece of fabric, such as cotton or linen, or a piece of soft, absorbent paper used at the table to wipe one's lips and fingers and to protect one's clothing

KEY TO VOCABULARY 2:

MATCHING

1. J.

2. D.

3. H.

4. G.

5. I.

6. A.

7. C.

8. B.

9. E.

10. F

VOCABULARY 3:

MATCHING

_____1. breakdown

_____2. dessert

_____3. appetite

_____4. tide (over)
as

_____5. verge

_____6. physical

_____7. grateful

_____8. aroma

_____9. irresistible

_____10. permission

A. having an overwhelming appeal; impossible to resist

B. a desire for food or drink

C. on the brink; on the extreme edge or margin of something

D. sweet food such as fruit, cake, pie, or ice cream served the last course at lunch or dinner

E. thankful; expressing gratitude

F. to fail to function; to stop being useful or operable

G. consent, especially formal consent to do something; agreeing to let do something

H. to support through a difficult period

I. a medical examination

J. a pleasant odor

KEY TO VOCABULARY 3:

MATCHING

1. F.

2. D.

3. B.

4. H.

5. C.

6. I.

7. E.

8. J.

9. A.

10. G.

VOCABULARY:

FILL IN THE BLANKS

attire
nutritious
hindering
asparagus
battery
incense
nagging
clerical
cramped
dietician
disorienting
restrictions
prescription
memorize
languishing

1. The loud music is ________________ my studying.

2. Most elementary school students __________________ the multiplication tables.

3. My office is somewhat _______________; I don't have room for another thing!

4. The hospital ___________________ is in charge of seeing that all meals meet the doctors' requirements.

5. Most people burn ______________ because it makes rooms smell pleasant and exotic.

6. _________________ medicine can only be obtained at a drugstore or pharmacy.

7. The teenager was ____________________ on the sofa, looking very tired and listless.

8. The doctor ordered a _____________ of tests in order to come to a final diagnosis.

9. ______________ work can include typing, filing, and answering the telephone.

10. Certain ________________ were put on President Clinton when he injured his knee so that his knee would have time to heal properly.

11. A pregnant woman should definitely eat _________________ meals in order to have a healthy baby.

12. Formal _____________ is almost always worn at weddings, proms, and some parties.

13. Husbands sometimes complain that they have _____________ wives.

14. _______________ is a very nutritious vegetable, but I do not particularly like it.

15. Riding rides at amusement parks that spin you around repeatedly can be quite __________________.

KEY TO VOCABULARY:

FILL IN THE BLANKS

1. hindering
2. memorize
3. cramped
4. dietician
5. incense
6. Prescription
7. languishing
8. battery
9. Clerical
10. restrictions
11. nutritious
12. attire
13. nagging
14. Asparagus
15. disorienting

WRITING A WANT AD

A primary difference between a job description which is usually kept on file in the Personnel Office or Human Resources Office of a company or business and a want ad or job announcement that appears in the newspaper or on a bulletin board is that the want ad often mentions not just duties or responsibilities but the abilities or skills that a person must possess in order to perform the job successfully. These may include not only skillls such as mathematical skills but the ability to interact or get along well with others Obviously, a Diet Clerk must be kind, cheerful, and helpul as he/she picks up filled-out menus from the patients. Also, a Diet Clerk needs to be able to get along well with doctors, nurses, dieticians, and chefs.

Keeping both duties and skills or abilities in mind, write a want ad or job announcement for a Diet Clerk.

WRITING A JOB DESCRIPTION

Molly Malone is a Diet Clerk at Mercy Memorial Hospital. It was her computer errors that caused patients' meals to be wrong. A Diet Clerk's major responsibility is to enter the data from the filled-out menus after he/she has collected the menus from the hospital floors. The Diet Clerk also must check personally with doctors and nurses to see what dietary restrictions a patient might have. The Diet Clerk must also coordinate with the dieticians and the chef to be certain that the appropriate meals are made. Finally, the Diet Clerk must also add up calories and protein and fat grams. As you can see, the Diet Clerk has a job with a great deal of responsibility, one that can have a serious impact on the health of patients.

Write a brief job description for a Diet Clerk so that anyone who applies for this position would know exactly what his/her responsibilities would be. Before you write the job description, try to put the responsibilities in chronological order, that is, establish the sequence of events that should be followed if a Diet Clerk is to perform his/her job efficiently.

JOB DESCRIPTION FOR A DIET CLERK

__VOCABULARY: FILL IN THE BLANKS

stiff
defection
confronted
trance
hilarious

tips
slander
reputation
quirk
sordid

preceded
competitor
avalanche
survey
pitfalls

1. The ______________ of the Russian ballerina to the United States caused outrage in the Russian press.

2. The skier was killed in an __________________ in the Catskill Mountains.

3. Many entertainers and celebrities are known for leaving generous ________ at restaurants.

4. Apple is a ________________ of IBM.

5. After hearing the tragic news of his son_s death, the father appeared to be in a _____________.

6. There are many ______________ to avoid when starting a business.

7. Once one_s ___________________ is ruined, it is quite hard to restore it to its previous state.

8. George Walker Bush _____________William Jefferson Clinton as President of the United States.

9. It is quite disgusting to ____________ someone in the newspaper.

10. When you buy a textbook for a course, you should first do a quick ____________ of its contents so that you will know the features that it offers.

11. In "The Case of the Amazing Mr. Minh," Mr. Minh_s cousin was putting starch in the guests_ underwear, making it ___________.

12. Both Jay Leno and David Letterman sometimes tell jokes that are truly _______________.

13. Most people find adultery to be really ______________.

14. One _________ of his behavior is that he always sings loudly with the radio while driving.

15. He ___________________ his enemy in the hallway of the courthouse.

__KEY TO VOCABULARY: FILL IN THE BLANKS

1. defection

2. avalanche

3. tips

4. competitor

5. trance

6. pitfalls

7. reputation

8. preceded

9. slander

10. survey

11. stiff

12. hilarious

13. sordid

14. quirk

15. confronted

__HOMOPHONES

Homophones are words that sound the same, but have different spellings and different meanings. Study the following pairs of homophones carefully.

minor, miner-- A **minor** is someone under legal age, that is, someone who is not yet a legal adult.
A **miner** is someone whose job is to extract minerals from the earth, such as gold or coal.

shone, shown--**Shone** is a past tense form of the verb **shine** meaning to give off light or to glisten
Shown is the past particple of the verb **show** meaning to display or cause to be seen.

made, maid-- **Made** is the past tense form and the past participle form (with a helping verb) of the verb **make** which means to create or construct.
A **maid** is a female servant or a girl or a young, unmarried woman.

gilt, guilt--**Gilt** is an alternate past tense and past participle of the verb **gilt** meaning covered with a thin layer of gold **(gild, gilded or gilt)**
Guilt is a noun meaning a sorrowful awareness of having done something wrong.

cheep, cheap-- **Cheep** is a word imitating the shrill, faint sound of a young bird, similar to **chirp**.
Cheap is an adjective meaning inexpensive or relatively low in price.

teem, team--**Teem** is a verb meaning to be full, usually in motion, to swarm, or abound.
Team is a collective noun metaning any group which is organized to work together.

peel, peal--**Peel** is a verb meaning to cut the bark, rind, or skin from something.
Peal is a noun meaning a loud noise as a ringing of bells or thunder or as a verb to utterly loudly with a full, deep, rich sound.

levee, levy--A **levee** is an embankment which is built to prevent a river from overflowing.
Levy is a verb which means to impose or collect a tax.

waive, wave--**Waive** is a verb meaning to give up a right or claim voluntarily.
A **wave** is a swell along a large body of water or, as a verb, to make a movement up and down or back and forth in the air.

straight, strait--**Straight** means extending in the same direction continuously without curving.
A **strait** is a narrow passage of water joining two large bodies of water.

Now, try your hand at using the correct word in the sentences below. Be sure to add endings to verbs where appropriate.

minor, miner

1. In Tennessee, you are considered a __________ if you are under eighteen.
2. A __________ spends a great deal of time underground.

shone, shown

3. The painting was first ____________ at an exhibit in New York City.
4. The sun __________ all day yesterday.

made, maid

5. The ___________ spent all morning polishing the furniture.
6. The boy __________ a model of the famous plane The Spirit of St. Louis.

gilt, guilt

7. The antique picture frame had been ____________ with gold leaf.
8. The criminal seemed to feel no ____________ for committing his crimes.

cheep, cheap

9. The bird_s ________ was very soft and pitiful as it waited for its mother to return to the nest.
10. One can find household cleaning items at a ___________ price at discount stores.

teem, team

11. The beehive ______________ with thousands of buzzing bees.
12. The baseball _____________ lined up for batting practice.

peel, peal

13. Mother___________ apples for the apple pie.
14. During the storm there was a tremendous ___________ of thunder.

levee, levy

15. According to the Constitution, only Congress can _________ taxes.
16. The workers worked feverishly in order to build the ____________ to hold back the rising waters of of the Mississippi River.

waive, wave

17. The ____________ in the ocean was so powerful it knocked her down.
18. The criminal ____________ his right to have an attorney present during the questioning.

straight, strait

19. The ______________, narrow road seemed to go on forever.
20. The boat navigated through the narrow ____________.

__KEY TO EXERCISE ON HOMOPHONES

1. minor
2. miner
3. shown
4. shone
5. maid
6. made
7. gilt
8. guilt
9. cheep
10. cheap
11. teemed
12. team
13. peeled
14. peal
15. levy
16. levee
17. wave
18. waived
19. straight
20. strait

__USING WHO AND WHOM

Using **who** and **whom** correctly is quite difficult for most speakers of English. **Who** is used as the subject of a question or clause. When there is no other word that can serve logically as the subject, **who** is the correct choice.
Look at the following examples.

Who is the author of that book?
That is the man who robbed me.
Who sent the flowers?
Ellen Gilchrist, who is a novelist, wrote The Annunication.

Whom is the correct choice when there is another word which can logically serve as the subject of a question or clause. **Whom** serves as the direct object of a question or clause or as the object of a preposition. Look at the following examples.

Whom can you trust? (direct object--the subject is **you**; think--you can trust whom, which puts **whom** in the direct object position, that is, following an action verb)

For whom are you calling? (object of the preposition **for**)

He is the person whom you hired last month. (**you** is the subject of the clause--think you hired whom last month.

To whom are you speaking? (Object of the preposition **to**)

Whom can you recommend? (Again, **you** is the subject.)

Try your hand at using these troublesome pronouns in the sentences below. Do not be discouraged if you find these particularly difficult. Most people do!

1. (Who, Whom) is the person responsible for this disaster?
2. (Who, Whom) wrote the novel For Whom the Bell Tolls?
3. (Who, Whom) can he blame for his problems?
4. John is the person (who, whom) I want to get the job.
5. By (who, whom) were you named?
6. He is the author (who, whom) I like best.
7. Albert Gore is the person (who, whom) President Clinton chose to be his Vice President.
8. Albert Gore is the candidate (who, whom) deserves nomination for the presidency in the year 2000.
9. For (who, whom) did you vote?
10. (Who, whom) performed CPR on the man (who, whom) stopped breathing?

__KEY FOR EXERCISE ON USING WHO AND WHOM

1. who

2. who

3. whom

4. whom

5. whom

6. whom

7. whom

8. who

9. whom

10. who, who

__VOCABULARY: MATCHING

_____1. convention

_____2. pitfallls

_____3. classy

_____4. crisis

_____5. reputation

_____6. DNA

_____7. preceded

_____8. maze

_____9. wallpaper

_____10. dizzy

A. a complex network of walled pathways; a maze

B. having the sensation of falling; giddy

C. a crucial point or situation; a turning point

D. a formal meeting of delegates, members, representatives, often national or international

E. decorative wall covering printed with designs or color

F. slang for elegant or stylish

G. the general esteem one is held in by the public; a specific trait or characteristic believed to be held by a person or thing

H. dangers or difficulties not easily avoided

I. came before in time

J. abbreviation for deoxribonucleic acid, the part of the living cell that determines individual hereditary characteristics

__KEY TO VOCABULARY: MATCHING

1. D.
2. H.
3. F.
4. C.
5. G.
6. J.
7. I.
8. A.
9. E.
10. B.

__VOCABULARY 2: MATCHING

_____1. confronted

_____2. quirk

_____3. tassel

_____4. nightmare

_____5. sabotage

_____6. competition

_____7. competitor

_____8. slander

_____9. sleuthing

_____10. defection

A. tracking or following as a detective would

B. a decoration consisting of a bunch of cords or strings tied at one end

C. a rival; the company with which another competes

D. a peculiarity of behavior

E. make a damaging statement against

F. come face to face with

G. damaging procedure or property in order to hurt productivity or normal functioning

H. a frightening dream or when awake, anything that arouses feelings of fear or stress as a nightmare does

I. leaving without permission something one had previously been loyal to

J. rivalry between two or more companies vying for the same customer or market

__KEY TO VOCABULARY 2 : MATCHING

1. F.
2. D.
3. B.
4. H.
5. G.
6. J.
7. C.
8. E.
9. A.
10. I.

__VOCABULARY 3: MATCHING

_____1. subversive

_____2. sordid

_____3. avalanche

_____4. refined

_____5. indubitably

_____6. hilarious

_____7. gratuities

_____8. survey

_____9. trance

_____10. starch

A. without a doubt; unquestionably

B. polite; well-bred; not having any rudeness or vulgarity

C. a general or comprehensive view or inspection

D. tending to ruin, destroy, undermine the character of; corrupt

E. small amounts of money given to acknowledge of services performed

F. a slide or fall down a mountainside of rock, snow, dirt, or other material; anything resembling such an overwhelming fall

G. very funny or merry in a loud or unrestrained way

H. a white powder used to stiffen fabrics

I. a dazed state; a state of feeling detached from one_s physical surroundings as in a daydream

J. filthy; dirty; morally depraved or degenerate

__KEY TO VOCABULARY 3: MATCHING

1. D.

2. J.

3. F.

4. B.

5. A.

6. G.

7. E.

8. C.

9. I.

10. H.

__CREATING A FORM TO DETERMINE GUEST SATISFACTION

Suppose that you are in charge of determining guest satisfaction in a major hotel. Create a simple Yes/No form which asks specific questions relating to services provided by the hotel. Examples might include overall cleanliness of the room, items provided by the hotel in the room such as facial tissue and toiletries, wakeup calls, the quality of room-service food, satisfaction with laundry and drycleaning services, and any other concerns that a guest might have.
Use your imagination!

	Yes	No
______________________________	____	____
______________________________	____	____
______________________________	____	____
______________________________	____	____
______________________________	____	____
______________________________	____	____
______________________________	____	____
______________________________	____	____
______________________________	____	____
______________________________	____	____
______________________________	____	____
______________________________	____	____
______________________________	____	____
______________________________	____	____
______________________________	____	____

__WRITING PARAGRAPHS

One pattern that one can use to write coherent, unified paragraphs is to use the **question-answer pattern**. This means that your topic sentence or what will be your first sentence using this pattern will be a question. The rest of the paragraph will simply be statements that answer the question. Write a paragraph using the question below as your opening sentence.

What kind of customer complaints were being received about the Housekeeping Staff by Martin Mall, the Hotel Manager? ____

__ANSWERING A LETTER OF COMPLAINT

Now, assume that you are Mr. Martin Mall, the Hotel Manager of the Hotel de Fanci Pantz. You are going to tell Mr. Mark Mayes why the situation occurred, the steps you have taken to correct the situation, and you express your regret for any inconveniences that he suffered during his stay at the hotel. Use the same format as you used for the previous letter.

____

____

____

____

____

____

Dear __________________:

____

____

____

____

____

____

____

____

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____

____

____

Sincerely,

Mr. Martin Mall
Hotel Manager

__WRITNG A LETTER OF COMPLAINT

You are Mr. Mark Mayes; you were a guest in the Hotel de Fanci Pantx June 1-4, 1997. To your great irritation, you found that the laundry starched your underwear, made up your bed too tightly, and received no mints on
your pillow at night as promised. Consequently, you write a letter of complaint to Mr. Martin Mall, the Hotel Manager. Your address is 412 Gateway Drive, Minneapolis, Minnesota 92764. Your letter is sent to Mr. Martin Mall, 301 N. 5th Street, New York, New York 48326. Simply inform Mr. Mall of your complaints and that you thought that he would like to know them so that he might take steps to correct the problems.

[Your street address] ______________________

[Your city, state, zip code] ______________________

[Today_s date] ____________________

______________________[The person to whom you are sending the letter]

______________________[His title]

______________________[The hotel_s name]

______________________[The hotel_s street address]

______________________[The hotel_s city, state, zip code]

Dear __________:

____

____

____

____

____

____

____

____

____

____

Sincerely,

[Writtten signature here]

Mark Mayes

VOCABULARY: MATCHING

______1. conundrum

______2. loss leader

______3. irate

______4. agitated

______5. short-handed

______6. mayhem

______7. malicious

______8. callow

______9. initiative

______10. thermometer

A. inexperienced, immature

B. highly upset

C. not having enough help to do a job

D. a device for measuring temperature

E. a puzzling problem or situation

F. chaos, confusion, disorder, often with violent behavior

G. very angry, full of rage

H. drive, determination, the ability to start and carry through with a plan

I. a product sold at a very low price in order to bring in customers

J. having a strong desire to cause harm and pain to others

KEY TO VOCABULARY: MATCHING

1. E.

2. I.

3. G.

4. B.

5. C.

6. F.

7. J.

8. A.

9. H.

10. D.

VOCABULARY: MATCHING

______1.	looting	A. the answer to a problem
______2.	sedan	B. a problem where all the solutions seem to be ones with undesirable aspects
______3.	gravy	C. a person who insists on things being done in a certain exact way
______4.	triple	D. the stock of items in a store that are to be sold
______5.	stickler	E. carrying off what is not yours as in a war or riot, stealing
______6.	cashier	F. consisting of three parts or kinds
______7.	dilemma	G. a sauce of fat and meat juices left from cooking meat, sometimes thickened with flour
_____8.	solution	H. an employee in a business who collects money from customers
______9.	merchandise	I. able to convince others of one's opinion or view
______10.	persuasive	J. an enclosed car (as opposed to a convertible) having two or four doors and a front and back seat

KEY TO VOCABULARY: MATCHING

1. E.

2. J.

3. G.

4. F.

5. C.

6. H.

7. B.

8. A.

9. D.

10. I.

VOCABULARY: FILL IN THE BLANKS

Use the words below in the sentences that follow.

migraine
callow
omelette
sizzled
sedan
loss leaders
rigid
averted
initiative
stickler
scoops
proposition

1. Isabella's ________________ was so severe that she stayed home from work and went to bed.

2. Employers usually value ____________________ in an employee.

3. The bacon ________________ in the frying pan.

4. The _____________ youth had just arrived in the city from the farm on which he grew up; he knew little about living in a big city.

5. Since chocolate is my favorite, I will have three __________ of ice cream.

6. When buying an automobile, I prefer a _________ to a convertible.

7. In "The Case of the Ice Cream Conundrum," Mrs. Mussolini was a

__________________ for following rules.

8. Thus, in "The Case of the Ice Cream Conundrum," Mrs. Mussolini was much too ___________ because she was inflexible when it came to rules.

9. Most people want some kind of filling in their _______________ such as ham, cheese, mushrooms, peppers, and so forth.

10. Many groceries often sell soft drinks at a very low price; soft drinks are used as ________________________ in order to get people in to the grocery.

11. Thanks to Inspector March, disaster was ____________________ at Major City Five and Dime.

12. Inspector March told Mrs. Mussolini that putting stocking shelves over serving ice cream to waiting customers was a losing ________________________.

KEY TO VOCABULARY: FILL IN THE BLANKS

1. migraine
2. initiative
3. sizzled
4. callow
5. scoops
6. sedan
7. stickler
8. rigid
9. omelette
10. loss leaders
11. averted
12. proposition

HOMOPHONES

Homophones are words which have the same sound but are spelled differently and have different meanings. Study carefully the following homophones.

already/all ready Already means previously or by a specified time. All ready means totally prepared or ready.

altogether/all together Altogether means totally or completely.
All together means completely together or gathered.

awhile/ a while Awhile is an adverb: Stay awhile.
A while--While is used as the object of a preposition. We stayed for a while.

principal/principle Principal can be a noun or an adjective meaning "chief official" or main or chief.
Examples: The principal of the school was Dr. Jones.
The principal cause of the accident was speeding.
Principle refers to moral truths or rules.

stationary/stationery Stationary means "not moving, staying in one place."
Stationery refers to paper and envelopes one uses for writing.

Now, try your hand at filling in the blanks in the sentences below with the appropriate homophone.

already/all ready

1. I have ________________ seen that movie.
2. I am ________________ to go to the movie.

altogether/all together

3. I have my clothes ________________ to pack.
4. I am ________________ pleased with your decision.

awhile/a while.

5. I am going to rest for ________________.
6. Rest ________________ before you start to paint again.

principal/principle

7. Honesty is a ________________ I live by.
8. The ________________ reason for the low voter turnout was a

lack of interest in the election.

stationary/stationery

9. The ____________________ front continues to hang over the Northeast.
10. The __________________ on which you wrote my letter is very pretty.

KEY TO HOMOPHONES

1. already

2. all ready

3. all together

4. altogether

5. a while

6. awhile

7. principle

8. principal

9. stationary

10. stationery

WRITING A WANT AD

It is obvious that a person working at Major City Five and Dime is both a stock clerk and a cashier. This person has the following duties: to stock the shelves, control the inventory, work the cash register, and handle customer service as well. Write a want ad for this job. In addition to the duties just described, you might also think about the qualities or characteristics a person should have who could perform this job well.

WANTED: STOCK CLERK/CASHIER

FILLING OUT AN EMPLOYMENT APPLICATION

Let's say that after Inspector March gets Mrs. Mussolini straightened out that you decide that you would like to apply for a job at Major City Five and Dime as a stock clerk/cashier. Fill out the application below; remember that in filling out a job application you should be accurate and thorough.

MAJOR CITY FIVE AND DIME EMPLOYMENT APPLICATION

NAME ______________________________
First Middle Last

STREET ADDRESS ______________________________

CITY, STATE, ZIP CODE ______________________________

TELEPHONE NUMBER ______________ DATE OF BIRTH ______________

POSITION APPLIED FOR ______________

DATE AVAILABLE ______________

ARE YOU WILLING TO WORK PART TIME YES__ NO__
WORK AT NIGHT YES__ NO__

EDUCATION AND/OR TRAINING

	NAME AND LOCATION	FROM TO	DATE OF GRADUATION
HIGH SCHOOL	______________	__________	______________
			MAJOR/MINOR
BUSINESS OR TECHNICAL	______________	__________	______________

TYPE OF DEGREE CONFERRED ______________

		FROM TO	MAJOR/MINOR
COLLEGE OR UNIVERSITY	______________	__________	__________

TYPE OF DEGREE CONFERRED ______________

PREVIOUS EMPLOYMENT
(Begin with most recent employment)

COMPANY NAME __________ DATE FROM TO __________ PHONE ( ) ______________

ADDRESS ______________________ Present or Last Supervisor ______________________

REASON FOR LEAVING ______________________________

MAY WE CONTACT? YES ___ NO ___

POSITION HELD ______________________ LAST SALARY __________

DUTIES________________________

VOCABULARY

Match the words on the left with their definitions on the right.

______1. prudent
______2. curious
______3. coalition
______4. behemoth
______5. deranged
______6. conclusion
______7. plot
______8. ingredient
______9. solicitor
______10. arteries
______11. conservative
______12. pet

A. a very large animal; huge
B. a secret plan; a conspiracy
C. tending to resist change and uphold existing institutions; supporting tradition
D. odd; unusual
E. mentally unbalanced
F. favorite
G. wise; cautious
H. branching tubes that carry blood to the heart
I. something that goes into a mixture
J. the end; the final part
K. various groups united in a common cause
L. an attorney or lawyer, especially in England

KEY: VOCABULARY: MATCHING

1. G.

2. D.

3. K.

4. A.

5. E.

6. J.

7. B.

8. I.

9. L.

10. H.

11. C.

12. F.

VOCABULARY: MATCHING

______1. prank
______2. epicurean
______3. stern
______4. lean
______5. sodium
______6. cafeteria
______7. posture
______8. vegetarian
______9. prescribed
______10. dyslexic
______11. diabetic
______12. mangle

A. a person who eats only plants and vegetables
B. an order in writing for medicine or medical treatment
C. not fat; very trim and fit
D. to ruin; mess up badly
E. having a learning disability in which a person sees letters swapped or transposed
F. serious; sober; grim; severe in appearance
G. a restaurant in which customers go through a line and choose foods from a counter before being seated
H. an amusing or humorous trick, sometimes having an evil intent
I. the way one carries one's body; a person's bearing or carriage
J. a person having a disease in which not enough insulin is produced by the pancreas, resulting in abnormally high levels of glucose in the blood
K. a chemical present in salt
L. having refined or luxurious tastes, particularly in eating and drinking

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KEY: VOCABULARY: MATCHING

1. H.
2. L.
3. F.
4. C.
5. K.
6. G.
7. I.
8. A.
9. B.
10. E.
11. J.
12. D.

VOCABULARY

Match the words on the left with the definitions on the right.

______1. amoeba
______2. protoplasm
______3. ticket
______4. rash
______5. insignificant
______6. miraculous
______7. litany
______8. virtue
______9. assassin
______10. spineless
______11. honor
______12. loyalty

A. a good quality
B. unimportant
C. lacking courage or will
D. faithfulness; supportiveness
E. a single-celled microscopic organism that is changeable in form
F. a person who murders someone who is politically prominent
G. causing wonder; appearing unexplainable and supernatural
H. the substance that makes up all living matter of plant and animal cells
I. a slip of paper issued for a traffic or parking violation
J. integrity; nobility of mind; living by high principles
K. acting too quickly without thinking beforehand
L. a long recital or tedious account of

KEY: VOCABULARY: MATCHING

1. E.
2. H.
3. I.
4. K.
5. B.
6. G.
7. L.
8. A.
9. F.
10. C.
11. J.
12. D.

PUNCTUATING TITLES: USING ITALICS (UNDERLINING) AND QUOTATION MARKS

You might have noticed that Marie Molyneux is described in "The Miracle Diet Plan" as having a face and figure that could have stepped off the cover of *Vogue*. *Vogue* is a high-fashion women's magazine, and you might note that this title is underlined. Sometimes a special type called italic is used instead of underlining. In italic print, letters usually slope to the right and may appear lighter than other print.

The following titles should always be underlined or in italic print:

books: *A Farewell to Arms*
television series: *Chicago Hope*
plays: *Hamlet*
magazines: *Time*
movies: *Independence Day*
works of art: *Mona Lisa*
newspapers: the *New York Times*
long poems: *Paradise Lost*
comic strips: *Peanuts*
genera, species: *Homo sapiens*
computer software: *WordPerfect*
entire recordings: *Great Beethoven Sonatas*
radio shows: *All Things Considered*
names of specific ships, satellites, spacecraft: *Challenger"*

On the other hand, titles of shorter things are placed inside quotation marks. The following should always be placed in quotation marks:

short stories: "The Ransom of Red Chief"
essays: "On Studies"
short poems: "Ozymandias"
songs: "Isn't It Ironic?"
episodes of a radio or television series: "The Soup Nazi"
articles in magazines: "Why Clinton Won the Election"
chapters of books: "Invertebrates"

Now, try your hand at using underlining and quotation marks. Underline or put in quotation marks the titles in the following sentences.

1. One of my favorite short stories is Flannery O'Connor's Good Country People.
2. The movie Evita stars Madonna in the title role.
3. One of Leonardo da Vinci's most famous paintings is The Last Supper.
4. I really like Eric Clapton's song If I Could Change the World, which appears in the movie Phenomenon.
5. I read People magazine when I want to relax.
6. My favorite television shows are ER, Frasier, Chicago Hope, and 3rd Rock from the Sun.
7. Did Dr. Thompson assign the chapter entitled Television

Violence in our textbook Media Issues?
8. In our house we read the Nashville Tennessean, the Nashville Banner, and USA Today every day.
9. The album Rubber Soul was a very popular one among fans of the Beatles.
10. Windows '95 was a highly advertised piece of software in 1995.
11. Wallace Stevens' poem Sunday Morning is one of his most famous ones.
12. Dilbert, Cathy, and The Wizard of Id are all comic strips appearing in Nashville newspapers.
13. The luxury liner Titanic sank on its maiden voyage in 1912.
14. I just finished reading a book called Decorations in a Ruined Cemetery.
15. Neil Armstrong announced to the world, just before becoming the first man to step on the moon, that the Eagle had landed.

KEY TO PUNCTUATING TITLES: USING ITALICS AND QUOTATION MARKS

1. "Good Country People"
2. *Evita*
3. *The Last Supper*
4. "If I Could Change the World" *Phenomenon*
5. *People*
6. *ER*, *Frasier*, *Chicago Hope*, and *3rd Rock from the Sun*
7. "Television Violence" *Media Issues*
8. *Nashville Tennessean*, *Nashville Banner*, *USA Today*
9. *Rubber Soul*
10. *Windows '95*
11. "Sunday Morning"
12. *Dilbert*, *Cathy*, *The Wizard of Id*
13. *Titanic*
14. *Decorations in a Ruined Cemetery*
15. *Eagle*

WRITING JOB DESCRIPTIONS

Job descriptions are very important because they make clear to both employer and employee exactly what is expected of the employee in terms of job performance. In the episode "The Miracle Diet Plan," the Food Service Manager tells the chief responsibilities of the Head Chef, the Cooking Staff, and the Food Service Attendants. By referring to the episode, write a brief job description for the Head Chef, the Cooking Staff, and the Food Service Attendants.

Head Chef: ______________________________

____

____

Cook: ______________________________

____

____

Food Service Attendant: ______________________________

____

____

____

____

WRITING PARAGRAPHS

Remember that a paragraph consists of a topic sentence which basically tells the reader what the paragraph is about. Then, the topic sentence is supported with examples or details relating to the topic sentence. In the episode "The Miracle Diet Plan," one of the Food Service Attendants messes up the Mayor's diet because he cannot read. Write a brief paragraph telling in what ways reading is important on your job. Think carefully; be creative! Then, write another brief paragraph telling how reading is important in your life outside work (as a citizen, a parent, as a driver, and so forth). Again, be creative--reading really is important! (Don't forget to indent 5 spaces at the beginning of each paragraph!)

PARAGRAPH 1

PARAGRAPH 2

WRITING A RESUME

In addition to filling out a job application, some employers also expect to receive a resume from each job applicant; a resume simply lists personal information, educational information, and work experience. It also allows the job applicant to list anything else he or she thinks might be of interest to the employer. These might include such things as the type of job preferred by the applicant, the applicant's hobbies, special abilities or talents, or the applicant's salary requirements. Although there are many variations used in resumes, you are going to work with one possibility. Work on completing the following resume.

[Name centered]
[Address centered]
[City, state, zip]
[Area code and phone #]

[Applying for the position of...with]
OBJECTIVE: ______________________________

EDUCATION

EMPLOYMENT

[Begin with most recent and go backward]

REFERENCES

VOCABULARY: MATCHING

_______1. rural

_______2. pneumatic

_______3. outskirts

_______4. frontier

_______5. cervical

_______6. appalled

_______7. pleasantries

_______8. unbiased

_______9. husky

_______10. eyewitness

_______11. jurisdiction

_______12. glorified

A. hoarse and low from emotion or use

B. having to do with the neck

C. made to seem more significant or great than is actually the case

D. having to do with the country as opposed to the city

E. someone who has personally seen someone or something

F. totally fair; free from prejudice

G. an area just beyond or on the edge of a settled area

H. range of authority or control

I. filled with air, particularly compressed air

J. courteous remarks made to make conversation easier

K. filled with horror, fear, or dread

L. an outlying region such as of a city; the part farthest away from the central area

KEY TO VOCABULARY: MATCHING

1. D.
2. I.
3. L.
4. G.
5. B.
6. K.
7. J.
8. F.
9. A.
10. E.
11. H.
12. C.

VOCABULARY: MATCHING

________1. installed
________2. citizenry
________3. divulge
________4. untamed
________5. bifocals
________6 sedan
________7. sophistication
________8. maiming
________9. stake
________10. curdled
________11. tailored
________12. overalls

A. having simple, neat, straight lines
B. wild, savage
C. risking loss or injury
D. to set up or put into operation for use or service
E. refinement; worldly knowledge
F. to tell, make public, reveal
G. loose-fitting trousers, usually made of denim, with bib front with straps, often worn over other clothes for protection from dirt
H. all of the citizens together
I. eyeglasses with two lenses which focus for both near and distant vision
J. totally disfiguring or mutilating
K. turned from liquid into a soft, lumpy mass
L. a closed automobile having a front and rear seat

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KEY TO VOCABULARY: MATCHING

1. D.

2. H.

3. F.

4. B.

5. I.

6. L.

7. E.

8. J.

9. C.

10. K.

11. A.

12. G.

LEARNING PREFIXES TO DETERMINE MEANING

A prefix is a word part that has its own meaning; it is added before a root or base word to make an entirely new word. Remember that when you add prefixes to familiar root or base words, the spelling does not change; you simply add the prefix to the root or base word. Knowing the meanings of prefixes can help you figure out the meaning of the word. Study carefully the prefixes, their meanings and the examples below.

PREFIX	MEANING(S)	EXAMPLES
ante-	before, in front of	antebellum, anteroom
anti-, ant-	against	antifreeze, antonym
co-, com-, col- con-, cor-	together, with	combine, coordinate, collapse, connect, correlate
ex, e-	out of	examine, emerge
in-, il-, im-, ir-	not, without	inaudible, illegal, immature, irregular
in-, il-, im-, ir-	in, into	inaugerate, illlustrate, imagine, irrupt
per-	through, throughout away, thoroughly	perennial, perfume, percolate, permeate
pre-	before,	premature, preview
pro-	forward, in place of, onward, forth	procession, proclaim procrastinate
pro-	before, in front of	prologue, protect
syn-, syl-, sym-	same. together, with	synonym, syllable, sympathy, symmetry

EXERCISE ON PREFIXES

MATCHING: Match the prefixes on the left with their definitions on the right.

________1. pre-

________2. ex-, e-

________3. anti-

________4. co-, com-, col- con, cor-

________5. per-

________6. syn-, syl-, sym-

________7. pro-

________8. in-, il-, im-, ir-

A. through, away, thoroughly

B. not, without

C. forward, in place of, forth, onward

D. out of

E. against

F. before

G. together, with, same

H. with, together, jointly

KEY TO EXERCISE ON PREFIXES

1. F.
2. D.
3. E.
4. H.
5. A.
6. G.
7. C.
8. B.

ADJECTIVES AND ADVERBS IN COMPARISONS

Adjectives are words which describe or modify nouns or pronouns and answer the questions What Kind, Which One(s), and How Many or How Much. Adverbs are words which modify verbs, adjectives, and other adverbs and answer the questions When, Where, How, and To What Extent. Examples of adjectives include *smart*, *tall*, *comfortable*, and *amazing*. Examples of adverbs include *fast*, *quickly*, and *completely*. Note that many adverbs end in *-ly*. Adjectives and adverbs can be used to compare people, places, and things. Regular adjectives and adverbs are said to be in the *positive* degree. When adjectives and adverbs are used to compare *two* people, places, or things, they are said to be in the *comparative* degree. The comparative degree is formed by adding *er* to one-syllable and many two-syllable adjectives and adverbs. The comparative degree is formed for some two-syllable adjectives and adjectives and for all over two syllables by adding the word *more* before the adjective or adverb. When comparing *three or more* people, places, or things, adjectives and adverbs are said to be in the *superlative* degree. To form the superlative degree, add *est* to one-syllable and many two-syllable adjectives and adverbs. The superlative degree is formed for some two-syllable and for all over two syllables by putting *more* before the adjective or adverb. Also, all adverbs ending in *-ly* form the comparative and superlative form by putting *more* and *most* in front of them. Note the following examples:

POSITIVE	COMPARATIVE	SUPERLATIVE
smart	smarter	smartest
fast	faster	fastest
comfortable	more comfortable	most comfortable
slowly	more slowly	most slowly

EXERCISE ON USING ADJECTIVES AND ADVERBS IN COMPARISON

Use the correct form of the adjective or adverb in parentheses.

1. Of Jan and Tom, Jan is the ________________ (tall).

2. This sofa is the ____________________ (comfortable) of all that I have tried.

3. Driver must drive ________________________ (slowly) on some stretches of the interstate than on others.

4. I find the novels of William Faulkner much ________________________ (interesting) than those of Ernest Hemingway.

5. Some people think that Babe Ruth is the ________________ (great) baseball player of all time.

6. Abraham Lincoln may well be our ___________________ (respected) President.

7. August is probably the ___________(hot) month of the year here.

8. I am one of those people who is the ____________________ (happy) when I am alone.

9. Pam is ________________ (young) than Peggy.

10. I have never seen a ____________________ (beautiful) night than last night.

11. Of Julia, Catherine, and Elizabeth, Catherine is the ________________________ (ambitious).

12. Jim responded ______________ (calmly) than Robert did to the emergency situation.

KEY TO EXERCISE ON USING ADJECTIVES AND ADVERBS IN COMPARISON

1. taller
2. most comfortable
3. more slowly
4. more interesting
5. greatest
6. most respected
7. hottest
8. happiest
9. younger
10. more beautiful
11. most ambitious
12. more calmly

TAKING A TELEPHONE MESSAGE

Often one is required to record telephone messages as part of one's job. A telephone call comes in at 0800 hours to Inspector March; "0800 hours" is 8:00 A.M. This is based on a twenty-four hour cycle of telling time. For example, "1300 hours" would be 1:00 P.M.; "2400 hours" would be 12:00 P.M. (midnight). The call is from Dr. Monica Masters, the Hospital Adminstrator at Mooneyville Medical Center. The message is that Dr. Masters has a case for Inspector March, a case in which the safety of every person in Mooneyville is at stake. She asks that Inspector March call her at 615-793-8925 as soon as possible. Record the message on the lines below.

TELEPHONE MESSAGES

TO: ______________________________

FROM: ______________________________________

____

TIME: ____________

MESSAGE: ____

____

____

____

____

____

SAMPLE TELEPHONE MESSAGE

TO: Inspector March

FROM: Dr. Monica Masters, Hospital Administrator at Mooneyville Medical Center
TIME: 8:00 A.M.

MESSAGE: Dr. Masters has a case for you. She says the safety of every person at Mooneyville Medical Center is at stake. Please call her as soon as possible at 615-793-8925.

VOCABULARY

Match the words on the left with the definitions on the right.

______1. innovative

______2. shift

______3. overtime

______4. clipboard

______5. forklift

______6. institute

______7. hostage

______8. productivity

______9. firearm

______10. reduction

A. a person held as security until certain conditions are met

B. a weapon firing a missile or projectile using gunpowder

C. the creation of goods or services to produce wealth

D. introducing something new

E. to begin or set in operation

F. a scheduled period of work

G. the amount by which something is lessened or made smaller

H. a small board with a spring clip at the top for holding a writing pad or papers

I. time worked beyond the normal scheduled hours

J. a device, usually on a truck, which lifts and stacks heavy objects using steel fingers or projections which are inserted under the load

KEY TO VOCABULARY: MATCHING 1

1. D
2. F
3. I
4. H
5. J
6. E
7. A
8. C
9. B
10. G

VOCABULARY

Match the words on the left with the definitions on the right.

______1. fastener
______2. dedication
______3 corridor
______4. psyche
______5. huddled
______6. hysteria
______7. breeding
______8. termination
______9. embedded
______10. recipient

A. good upbringing or training
B. something that connects, joins, or attaches to something else
C. a person who receives; receiver
D. crowded together
E. a firing from a job
F. total commitment to a particular goal, cause, or course of action
G. the human mind, soul, or spirit
H. an outbreak of uncontrolled emotion or feeling, such as wild laughing, crying, or screaming
I. firmly fixed or buried in something
J. a long hall or passageway, especially one with many rooms opening off it

KEY: VOCABULARY MATCHING 2

1. B

2. F

3. J

4. G

5. D

6. H

7. A

8. E

9. I

10. C

VOCABULARY: FILL IN THE BLANKS

Using the words below, fill in the blanks in the sentences with the correct vocabulary choice.

innovative
desperate
hostility
fasteners
forklift

defuse
termination
dedication
embedded
hostage

shift
productivity
overtime
recipient

1. Not only did I work my regular forty scheduled hours, but I also worked twenty hours ___________________.

2. The airplane hijacker took a ___________________ from the passengers on the plane and demanded that the plane fly to Iran.

3. I prefer working the 7:00 A.M. to 3:00 P.M. ____________ as opposed to the 3:00 P.M. to 11:00 P.M. one.

4. __________________ deeply in my character is a belief in being loyal to one's friends.

5. The employee was rewarded for his exciting, ___________________ ideas which saved the company many thousands of dollars.

6. Employers obviously appreciate employees who display genuine

____________________ to their jobs.

7. The Service Manager was the __________________ of an Employee of the Month Award.

8. One of the major goals of business is to achieve high ___________________ and maintain high quality.

1

9. The employee's frequent lateness to work and his generally poor job performance led to his ___________________.

10. Inspector March is often called upon to _____________ tense, and even dangerous, situations.

11. The Major Manufacturing Corporation made and distributed industrial ____________________.

12. A ________________ was used by Major Manufacturing Corporation to deliver parts from one station to another.

13. Often employees feel __________________ toward the company when they think they have been passed over for promotions.

14. Mason Mosley was __________________ to get someone to pay attention to his problem, so he took Mr. Marcos hostage.

KEY: VOCABULARY: FILL IN THE BLANKS

1. overtime

2. hostage

3. shift

4. Embedded

5. innovative

6. dedication

7. recipient

8. productivity

9. termination

10. defuse

11. fasteners

12. forklift

13. hostilit

14. desperate

HOMOPHONES

Homophones are words that sound alike but are spelled differently and have different meanings. Below are some very common, troublesome homophones; study them carefully.

its--is a possessive pronoun. Example: Put the file in _its_ place.

it's--is a contraction for _it is_. Example: _It's_ necessary to complete this job today.

there--is an adverb telling _where_ or an introductory word.
Examples: The report is over _there_.
There are three hundred employees in this company.

their--is a plural possessive adjective. Example: That is _their_ new car.

they're--is a contraction for _they are_. Example: _They're_ working hard to complete the project by December.

who's--is a contraction for _who is_. Example: _Who's_ the new president of the company?

whose--is a possessive pronoun or adjective. Examples: _Whose_ new car is that? (adjective modifying _car_)
Whose is that? (pronoun replacing a noun such as car)

your--a possessive adjective. Example: _Your_ contribution to to the company is greatly appreciated.

you're--contraction for _you are_. Example: _You're_ doing an excellent as a Service Manager.

Exercise: Now, try your hand at the sentences below. Circle or underline the correct choice.

1. (Its, It's) very satisfying to receive praise from an employer.

2. The part must be secured to (its, it's) proper place.

3. (Their, They're, There) coming to the office party, aren't they?

4. (Their, They're, There) spirits were very high after the new product line was introduced to an appreciative public.

5. The new manager is standing (their, they're, there).

6. (Whose, Who's) presiding over the departmental meeting?

7. (Whose, Who's) idea was that?

8. (Your, You're) first job evaluation will take place in six

months.

9. (Your, You're) not unhappy with your new position, are you?

KEY TO HOMOPHONE EXERCISE

1. It's
2. its
3. They're
4. Their
5. there
6. Who's
7. Whose
8. Your
9. You're

WRITING PARAGRAPHS

When writing a paragraph, you should develop one topic; usually, you provide at the beginning a topic sentence which states the main idea of the paragraph. Then, you support the topic sentence with examples and details. The first sentence of a paragraph is indented five spaces from the margin to indicate that a new paragragh has begun. Write a paragraph explaining to Ms. Manners your frustration with your job because the "hot jobs" or emergency runs are causing you to fall behind with your normal schedule. You might tell her how you think the solution to the problem would be to let each Material Handler see his or her schedule each morning so that he or she could make adjustments. Emphasize to her the importance of each Material Handler feeling that he or she is part of a team working together with management to see that the work gets taken care of the fastest way possible. A possible topic sentence might begin with "I am currently feeling very frustrated with my job because..."

WRITING A SUGGESTION TO THE BOSS

Mason Mosley was frustrated because he felt he had no control over his daily schedule at work. Perhaps if he had expressed his concern to his immediate supervisor, Ms. Manners, the problem could have been solved much earlier. Write a brief letter to Ms. Manners explaining that the emergency runs for "hot jobs" have interfered with your normal runs and decreased productivity. Your suggestion is that Material Handlers be shown their schedules the first thing each morning, especially for any "hot jobs" or potential emergencies. Explain that this would give the Material Handlers a chance to reorganize their normal duties and even allow them to request additional help if needed when it seems that their work might get backed up.

[Date] ______________________

______________________: [Salutation]

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____

[Complimentary close] ______________________

[Signature]

Mason Mosley
Material Handler

VOCABULARY

Match the words on the left with their definitions on the right.

______1. disgruntled	A. snug; warm and comfortable
______2. controversy	B. a witty or clever saying
______3. quip	C. a mob; a disorderly, noisy crowd
______4. felony	D. a serious crime, such as murder, rape, and burglary
______5. misdemeanor	E. fired from a job or position
______6. cozy	F. quarrel; arguing a question where differences of opinion exist
______7. terminated	G. without a spot or stain; totally clean
______8. immaculate	H. in a bad humor or mood; dissatisfied; discontented
______9. rabble	I. spoiling the appearance of
______10. defacing	J. a less serious breaking of the law such as a traffic violation or disturbing the peace

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KEY: VOCABULARY MATCHING 1

1. H

2. F

3. B

4. D

5. J

6. A

7. E

8. G

9. C

10. I

VOCABULARY

Match the words on the left with their definitions on the right.

______1. premediated

______2. comrades

______3. tranquil

______4. budget

______5. veritable

______6. littering

______7. civil

______8. geriatric

______9. singularly

______10. objectivity

A. of citizens; occurring among citizens

B. true; actual; real

C. peaceful; calm

D. fairness; impersonal; unbiased

E. having to do with the elderly or old age

F. an estimate of the amount of money that will be received and spent for various purposes

G. friends; fellow workers; partners

H. planned or considered beforehand

I. extraordinarily; unusually

J. leaving odds and ends scattered about; making untidy or disordered

KEY TO VOCABULARY: MATCHING 2

1. H

2. G.

3. C

4. F

5. B

6. J

7. A

8. E

9. I

10. D

WORD ROOTS

The word veritable comes from the Latin word verus meaning "true." Several words in English use this as a root. Study the examples below:

veritable--an adjective meaning "true," "actual," "real."

verify-- a verb meaning to prove the truth or accuracy of by providing evidence or substantiation.

veracious--an adjective meaning "honest," "truthful."

verisimilitude--a noun meaning appearing to be probable, true, or likely--often a term applied to literature.

verification--a noun meaning a confirmation of the truth.

veracity--a noun meaning an habitual conformity or adherence to the truth.

verity--a noun meaning a principle, belief, or statement believed to have permanent truth.

Exercise: See if you can use the correct word in the sentences below.

1. George Washington has always been regarded as a ________________ man.

2. The personnel director has to ________________ the information on employment applications.

3. I regard the Golden Rule as an eternal ________________.

4. We usually expect excellent fiction to have ____________________.

5. Abraham Lincoln is also commonly regarded as a man of ______________.

6. Spending time with one's family is a __________________ delight.

7. The president of the company sent the budget figures to each department head for _______________________.

KEY TO WORD ROOTS

1. veracious
2. verify
3. verity
4. verisimilitude
5. veracity
6. veritable
7. verification

CONTRACTIONS

A contraction is a word formed by joining two words together, leaving out some of the letters of one word and replacing the letters left out with an apostrophe ('). Contractions are particularly used in speech, and sometimes are used by writers to give an informal, conversational tone to their writing.
Study the following words and their contractions.

Two words	Contraction
I am	I'm
you are	you're
he is	he's
it is	it's
she is	she's
what is	what's
who is	who's
there is	there's
I have	I've
they have	they've
we have	we've
are not	aren't
could not	couldn't
does not	doesn't
do not	don't
has not	hasn't
have not	haven't
is not	isn't
might not	mightn't
could not	couldn't
was not	wasn't
were not	weren't

would not	wouldn't
he will	he'll
I will	I'll
it will	it'll
she will	she'll
that will	that'll
there will	there'll
they will	they'll
we will	we'll
he would	he'd
I would	I'd
she would	she'd
they would	they'd
we would	we'd

EXERCISE ON CONTRACTIONS

Now, try your hand at forming the following contractions.

1. I am __________
2. you are __________
3. does not __________
4. who is __________
5. could not ______________
6. we have ___________
7. are not ___________
8. is not ___________
9. they have _____________
10. were not ______________
11. would not ____________
12. I will ____________
13. we would _____________
14. have not _____________
15. it is __________

KEY TO EXERCISE ON CONTRACTIONS

1. I'm
2. you're
3. doesn't
4. who's
5. couldn't
6. we've
7. aren't
8. isn't
9. they've
10. weren't
11. wouldn't
12. I'll
13. we'd
14. haven't
15. it's

WRITING A SET OF DIRECTIONS

Select a simple recipe which you know how to fix. Write a set of specific directions on how to prepare this recipe. First, specify what ingredients and items are needed. Then, tell very specifically how to prepare this food. It might be as simple as how to prepare an omelette, a particular type of sandwich, or how to scramble eggs. Remember that each step should be included.

INGREDIENTS:

____

____

____

____

____

STEPS IN PREPARING THE RECIPE OR ITEM:

____

____

____

____

____

____

____

____

____

____

WRITING A LETTER OF APOLOGY OR RETRACTION

Mr. Magoogan must write to Mrs. Madison explaining how he has come to the realization that Mrs. Madison has many wonderful qualities as a Head Cook. For example, she is an excellent cook, keeps an immaculate kitchen, and creates a family atmosphere for the residents of Major City Retirement Home. He asks her to please consider coming back to work there; he also explains that he intends to get Mrs. Maldonaldo, a retired bookkeeper, to work with Mrs. Madison on her budget, teaching her how to keep a budget.

[date] ____________________________

____________________________: [salutation]

____

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____

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____

____

[complimentary close]____________________________

[signature] ____________________________
[title] ____________________________

VOCABULARY

Match the words on the left with the definitions on the right.

_______1. sonic

_______2. complex

_______3. enormous

_______4. baffling

_______5. siesta

_______6. complaint

_______7. status

_______8. maze

_______9. stagger

______10. efficient

A. state or condition

B. confusing, bewildering

C. to move unsteadily, totter

D. acting effectively with a minimum of wasted time or effort

E. huge, immense, vast

F. a confusing, complicated network of passages or hallways

G. a midday rest or nap, particularly after a meal

H. involved, complicated, intricate

I. relating to sound

J. a grievance, an expression of dissatisfaction

KEY TO VOCABULARY: MATCHING

1. I.
2. H.
3. E.
4. B.
5. G.
6. J.
7. A.
8. F.
9. C.
10. D.

VOCABULARY

Fill in the blanks in the following sentences with the words below.

inventory recall espionage credentials authorizes

1. Sam's Electronics Repair Warehouse kept many parts needed for repairs in their ________________________.

2. Often automobile manufacturers must __________ a particular model because of possible danger to the consumer.

3. Licenses, certificates, and diplomas are all types of __________________.

4. Many large corporations have very tight security because of their fear of industrial _______________________.

5. Often when we take a car or appliance to be repaired, we must sign a form which ______________________ the company to do the necessary work.

rash refurbish conspiracy programming enigma

1. It is truly a(n) ____________________ to most of us why our society is becoming increasingly violent.

2. Many people still believe that the assassination of President John F. Kennedy was the result of a ________________________.

3. _______________________ a VCR seems to be beyond the ability of those of us who are "mechanically challenged."

4. A ______________ of accidents shut down the interstate for

hours.

5. Sometimes it brightens our spirits to simply ____________________ our homes or workplaces.

KEY TO VOCABULARY: FILL IN THE BLANKS

1. inventory
2. recall
3. credentials
4. espionage
5. authorizes

1. enigma
2. conspiracy
3. Programming
4. rash
5. refurbish

THE TROUBLESOME VERBS LIE AND LAY

In "The Enigma of the Endless Eject Button," Lillian says to Sam, "Why don't you just go lie down?" To lie is to rest or recline or remain in the same place. It is an intransitive verb; in other words, it never takes a direct object. The action is complete with the subject. Note the conjugation of this verb:

Present	Past	Past Participle
lie	lay	lain

Note the following examples:

I lie down every afternoon after school

The dog lay on the patio, basking in the sun.

I have lain down every day this week.

Nashville lies north of Winchester.

I was lying down when the phone rang.

To lay is to put or place. It is a transitive verb which means that it always takes a direct object. In other words, one must lay or put or place something or someone. The subject of the sentence acts upon an object or person. Note the conjugation of this verb :

Present	Past	Past Participle
lay	laid	laid

Note the following examples:

The workmen are laying my new bedroom carpet.

Lay the books on the table in the hall.

I have laid your clean clothes on the bed.

He laid the test on the teacher's desk.

Try your luck by placing the correct verb forms in the following sentences.

1. Dad was ______________ in the hammock in the back yard.
2. ________ the pattern for the dress on the table.
3. Jane has ___________ down for a nap every day since she was ill.
4. _______________ a marble floor takes skill and patience.

5. Seattle _______ north of Los Angeles.

6. John _______ in bed for a week with the flu.

7. _______ down and relax for a while.

8. The cat was __________________ in the grass.

9. I have _________ your mail on your chest of drawers.

10. I sometimes like ______________ on the sofa and watching television.

KEY TO EXERCISE ON LIE AND LAY

1. Dad was lying in the hammock in the back yard.
2. Lay the pattern for the dress on the table.
3. Jane has lain down for a nap every day since she was ill.
4. Laying a marble floor takes skill and patience.
5. Seattle lies north of Los Angeles.
6. John lay in bed for a week with the flu.
7. Lie down and relax for a while.
8. The cat was lying in the grass.
9. I have laid your mail on your chest of drawers.
10. I sometimes like lying on the sofa and watching television.

PREFIXES

A prefix is an affix (something attached to a root or base word) which is added in front of a root word. In "The Enigma of the Endless Eject Button," the word recall consists of the prefix "re" which has been added to the root word call. Prefixes change the meaning of a word; they are merely added in front of the root word: No letter is added or dropped when the prefix is added to the root.

Form new words by adding the prefixes to the root words below.

1. im + mature = ________________
2. mis + spell = ________________
3. un + natural = ________________
4. mis + state = ________________
5. ir + regular = ________________
6. il + legal = ________________
7. pre + exist = ________________
8. re + entry = ________________
9. inter + racial = ________________
10. semi + precious = ________________

KEY TO PREFIXES EXERCISE

1. immature
2. misspell
3. unnatural
4. misstate
5. irregular
6. illegal
7. preexist
8. reentry
9. interracial
10. semiprecious

WRITING JOB DESCRIPTIONS

Sam's Electronics Repair Warehouse employs a department supervisor, repair personnel, and runners. Based on the information given in the episode "The Enigma of the Endless Eject Button," write brief job descriptions for these positions, specifically stating their duties and responsibilities.

DEPARTMENT SUPERVISOR:

REPAIR PEOPLE:

RUNNNERS

WORK ORDERS

Make up a work order form for Sam's Electronics Repair Warehouse, listing not only the customer's name, address, and phone number, but several possible problems with electronic equipment (VCR's, stereos, televisions) that repair people would need to check off on the form. A place should be provided for the repair person to initial, showing who handled the repair.

SAM'S ELECTRONICS REPAIR WAREHOUSE

____

____

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____

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DETAILING THE CHAIN OF RESPONSIBILITY

Make a step-by-step list detailing what happens from the time a VCR appears at the Repair Window until the time it is repaired and ready to be returned to the customer.

____

____

____

____

____

____

____

____

____

____

____

VOCABULARY: MATCHING

Match the words on the left with the definitions on the right.

______1. attire
______2. rifle
______3. receptionist
______4. recession
______5. ricocheting
______6. squad
______7. palpitations
______8. inefficient
______9. prone
______10. incessant

A. a team (noun) or part of a team or special group (adjective)
B. very rapid tremblings or pulsations of the heart
C. wasting time, money, effort, or goods
D. inclined to, leaning toward
E. a person whose job is to greet customers or clients and to answer the telephone
F. to search through especially when attempting to steal
G. a moderate period of economic decline --not as severe as a depression
H. continuing without stopping
I. dress; clothes
J. bouncing or skipping off a surface

KEY TO VOCABULARY: MATCHING

1. I

2. F

3. E

4. G

5. J

6. A

7. B

8. C

9. D

10. H

VOCABULARY: MATCHING

______1. mute

______2. involuntary

______3. illegal

______4. bribe

______5. coincidence

______6. neuro-motor

______7. innuendo

______8. suspicion

______9. intrastate

______10. reflex

A. having to do with nerve impulses reaching and stimulating muscles

B. within the state

C. an automatic response to something not requiring thought beforehand

D. against the law

E. silent, not making noise

F. a doubt about someone or something without proof or evidence

G. happening automatically without any thought necessary beforehand

H. something given to someone, usually money, to get them to act dishonestly or illegally

I. events happening at the same time or simultaneously which appear to be related but are actually accidental

J. any remark or gesture which suggests or implies something insulting or unpleasant

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KEY TO VOCABULARY: MATCHING

1. E

2. G

3. D

4. H

5. I

6. A

7. J

8. F

9. B.

10. C

VOCABULARY: FILL IN THE BLANKS

Using the words below, fill in the blanks with the correct vocabulary word.

Corgis
tense
fasteners
gymnasts
hostile
jolt
endorsements
commercials
located
venting

1. I was ______________ my displeasure over the company's new policy.

2. It is only natural to feel _____________ toward someone who has treated us badly.

3. MOst people feel somewhat ____________ before a test or a job interview.

4. Many celebrities, particularly athletes, give ____________________ to various products on television.

5. Sometimes it seems that we see more ________________________ than program on television.

6. ______________ perform exercises on special equipment such as, the balance beam, the rings, the vault, the pommel horse, and parallel bars, displaying their flexibility, strength, and balance.

7. The body of the missing woman was ________________ in the woods by police dogs.

8. Bolts, buttons, clasps, hooks, and clasps are all types of
________________________.

9. It is a real ____________ when one is suddenly fired from a job.

10. Welsh ______________ are dogs with short legs, long bodies, and pointed ears.

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KEY TO VOCABULARY: FILL IN THE BLANKS

1. venting

2. hostile

3. tense

4. endorsements

5. commercials

6. Gymnasts

7. located

8. fasteners

9. jolt

10. Corgis

FORMING NOUN PLURALS

Most words in English form their plurals by simply adding -s to words. Note the following examples:

shoes
tigers
messages
friends

However, there are specific rules which apply to certain types of words. To form the plurals of words ending in ch, sh, x, or z, add -es. Note the following examples:

churches
foxes
brushes
waltzes

To form the plurals of words ending in -y that have a consonant (any letter except a, e, i, o, u) in front of the -y, change the y to i and add -es. Here are some examples:

country--countries
lady--ladies
cry--cries
army--armies
secretary--secretaries
company--companies

To form the plurals of words ending in -y with vowels in front of the -y, simply add -s. The following are examples:

alleys
boys
turkeys
trays
holidays
keys

Some nouns that end in -f or -fe simply add -s. Note these examples:

proofs
beliefs
handkerchiefs
chiefs
roofs
puffs

However, with other nouns ending in -f or -fe, the -f changes to -v before adding -s or -es. Some examples are the following:

life--lives
leaf--leaves
shelf-shelves

Most nouns that end in -o simply add -s. However, some nouns that end in -o add -es. Study the following examples carefully; when in doubt, look up the words in the dictionary.

altos
pianos
rodeos

But,

heroes
potatoes
tomatoes

Also, there are some nouns that do not change from a singular to a plural form; one only knows that they are singular or plural by the context in which they are used. The following nouns do not change, regardless of number:

sheep
salmon
moose
tuna
deer
bass
trout

Finally, there are irregular plurals, that is, nouns that form their plurals in unique ways. Study these examples carefully:

man--men
ox--oxen
goose--geese
tooth--teeth
mouse--mice
child--children

EXERCISE ON FORMING NOUN PLURALS

After studying the rules on forming noun plurals, try your hand at the ones below.

1. child ________________
2. chef ________
3. baby _________
4. bunch __________
5. wax _______
6. attorney _____________
7. deer ________
8. belief __________
9. glass _________
10. half _________
11. pony _________
12. dynamo __________
13. knife __________
14. hero _________
15. valley ___________
16. calf ___________
17. crash ___________
18. apple ___________
19. tomato ____________
20. wife _________
21. woman __________
22. ox _______

23. self ____________

24. dish ____________

25. foot ________

26. family ______________

27. pinch _______________

28. sheep ____________

29. safe ___________

30. leaf ___________

KEY TO EXERCISE ON NOUN PLURALS

1. children
2. chefs
3. babies
4. bunches
5. waxes
6. attorneys
7. deer
8. beliefs
9. glasses
10. halves
11. ponies
12. dynamos
13. knives
14. heroes
15. valleys
16. calves
17. crashes
18. apples
19. tomatoes
20. wives
21. women
22. oxen
23. selves
24. dishes
25. feet
26. families

27. pinches

28. sheep

29. safes

30. leaves

NOUN POSSESSIVES

The apostrophe (') has two uses in English: to show what letters are left out or omitted from a contraction (as in can't for cannot) and to show possession or ownership. To form the possessive of a singular noun, simply add 's.

Examples: the dog's dish
the girl's dress

To form the possessive of a plural noun which ends in -s, simply add an apostrophe (').

Examples: the settlers' troubles
the players' strategies
the winners' circle

Plural nouns which are irregular, that is, their plural form does not end in -s, form the possessive by adding 's, just as singular nouns do.

Examples: the children's telephone
the geese's wings
the women's restroom

Joint versus single ownership: If something is owned jointly or equally, the 's comes only after the second name.

Example: Robin and Jane's apartment

If, however, each person owns separately, the 's occurs after each person's name.

Example: John's and Bill's shoes

Now, try your hand at using noun possessives. Good luck! Add an ' or 's to the words indicated below.

1. the book__ covers

2. the boy__ room

3. the men__ club

4. the cat__ meow

5. the tooth__ cavity

6. the libraries__ supporters

7. the women__ movement

8. the company__ address

9. the senators__ votes

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10. Davy Crockett__ rifle

KEY TO NOUN POSSESSIVES

1. books'
2. boy's
3. men's
4. cat's
5. tooth's
6. libraries'
7. women's
8. company's
9. senators'
10. Crockett's

TAKING AN ORDER BY PHONE

Most of the orders for industrial fasteners come to Major Manufacturing Corporation, or 2M, by telephone. You are the head of the Order Department, responsible for correctly taking down the orders from both the telephone and from the sales reps who personally come in to leave an order. A call comes in from Paul Pilson, a sales rep for Jackson Industrial Corporation on January 21, 1997, for 10,000 industrial fasteners. The company's address is 1739 Industrial Boulevard, Nashville, Tennessee 37204. The company's phone number is 615-734-9654. The total cost of the fasteners is $5275.29. Fill in the appropriate information on the form below.

ORDER FORM

Order # 15792
Date__________________

Order Submitted by

Name________________________________

Company________________________________

City________________________________

State__________________Zip__________

Phone ________________________

We hereby agree to furnish the following:

____

At a cost of ________________________

Order taken by______________________________

WRITING A JOB DESCRIPTION

As we saw in "The Case of the Cool Reception," Miles McBean was not a very efficient receptionist. Write a job description for a receptionist, listing duties and characteristics of an excellent receptionist. A receptionist's primary duties are answering the phone and greeting and directing customers. A pleasant telephone voice would be a plus, as would a pleasing personality in general; certainly, as we saw in "The Case of the Cool Reception," a receptionist needs to have experience or training in operating a complex phone system in which many calls might come in at the same time.

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VOCABULARY

MATCHING: Match the vocabulary words on the left with their definitions on the right.

_______1. eliminate
_______2. thorough
_______3. tortured
_______4. administrative
_______5. artificial
_______6. uncanny
_______7. lynched
_______8. tic
_______9. residential
_______10. plague
_______11. meddling
_______12. attest

A. an epidemic of a disease having a high rate of mortality or death
B. created by man, not by nature
C. totally complete; showing attention to every detail
D. to declare to be true, correct, or genuine
E. killed by a mob without legal process
F. twisted, distorted
G. interfering in someone else's business or affairs
H. relating to the management of affairs; relating to the management of an institution, public or private
I. get rid of, remove
J. a habitual, spasmodic muscular contraction or twitching, usually of the face or extremities and usually neurological in origin
K.. mysterious; appearing to have a supernatural origin
L. relating to houses or dwellings

KEY TO VOCABULARY: MATCHING

1. I.
2. C.
3. F.
4. H.
5. B.
6. K.
7. E.
8. J.
9. L.
10. A.
11. G.
12. D.

Now, let's try using some of these words in sentences.

eliminate____

____

____

administrative____________________________________

____

____

thorough____

____

____

artificial____

____

____

residential_______________________________________

____

____

VOCABULARY

MATCHING: Match the words on the left with their definitions on the right.

_______1. mall
_______2. weekend
_______3. thankless
_______4. profile
_______5. metaphor
_______6. obstructing
_______7. turn-over
_______8. bawled
_______9. rude
_______10. apologize

A. Cried or howled loudly
B. unlikely to receive appreciation for
C. blocking by putting an obstacle in the way
D. the time between the closing of one work week and the beginning of another
E. a comparison between two unlike things
F. showing a lack of courtesy, manners, or delicacy
G. the passageway to rows of stores
H. sketch or outline of a person's characteristics and/or achievements
I. to express regret or sorrow for what one has done
J. the number of employees hired by a company to replace those who have left

KEY TO VOCABULARY: MATCHING

1. G.
2. D.
3. B.
4. H.
5. E.
6. C.
7. J.
8. A.
9. F.
10. I.

Now, let's try using some of these words in sentences.

weekend____

____

____

rude____

____

____

apologize____

____

____

mall____

____

____

thankless____

____

____

VOCABULARY DEVELOPMENT THROUGH UNDERSTANDING SUFFIXES

Suffixes are meaningful groups of letters that are attached to the end of a root or base word. They fall into three main categories: verb-forming suffixes, adjective-forming suffixes, and noun-forming suffixes. Study the suffixes, their meanings, and examples of words using these suffixes below.

VERB-FORMING SUFFIXES

SUFFIX	MEANING	EXAMPLES
-ate	become, apply, do, make, treat	associate, pollinate concentrate
-en	cause to be	lengthen, thicken
-ize (-ise)	make, make into, cause to be	materialize, dramatize, advertise

NOUN-FORMING SUFFIXES

-al	act or process of	approval, denial
-ance, -ence	condition, degree act, process	riddance, silence
-dom	state, condition	freedom, serfdom
-hood	state, rank, condition	boyhood, brotherhood
-ism	doctrine, act, manner	feminism, heroism racism
-ment	state, quality, action	environment, punishment
-ist	a person who believes, does, makes	radiologist, dramatist
-ness	quality, state	righteousness
-ant, -ent	that which, one who	claimant, deterrent

ADJECTIVE-FORMING SUFFIXES

-ful	having qualities	faithful, useful
-less	lacking	painless, faithless
-like	similar, like	childlike, lifelike
-ward	in the direction of	backward, homeward
-al	belonging to, resembling	nocturnal, global
-ate	being like, having	fortunate, affectionate
-en	like, made of	ashen, wooden
-ic	full of, like, with, of	angelic, athletic
-ive	inclined to, tending to	active, productive

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EXERCISE ON FORMING WORDS WITH SUFFIXES

Now, try your hand at forming words which fit into the following sentences. Add a suffix to the words in parentheses to make the sentences meaningful.

1. A ________________ is someone who drives an automobile (motor).

2. The wagon trains moved ________________ across the United States (west).

3. A good boss treats his or her employees with ________________ (kind).

4. I felt great ________________________ when I failed to receive my promotion (disappoint).

5. It makes my heart rate _______________ when I am enjoying a basketball game (quick).

6. The picture was remarkably __________________ (life).

7. We are increasingly living in a _____________ economy (globe).

8. Many United States territories, such as Guam, long for ______________________ (state).

9. Acupuncture is said to be a relatively _______________ treatment (pain).

10. The ______________________ in a trial is the one who has been accused of wrongdoing or criminal behavior (defend).

KEY TO EXERCISE ON SUFFIXES

1. motorist
2. westward
3. kindness
4. disappointment
5. quicken
6. lifelike
7. global
8. statehood
9. painless
10. defendant

IRREGULAR COMPARISONS OF ADJECTIVES AND ADVERBS

Regular adjectives and adverbs are said to be in the positive degree. When they are used to compare two people, places, or things, they are said to be in the comparative degree. When they are used to compare three or more people, places, or things, they are said to be in the superlative degree. Adjectives and adverbs that form the comparative and superlative degrees irregularly must be studied and memorized. Study the following forms.

POSITIVE	COMPARATIVE	SUPERLATIVE
good	better	best
well	better	best
little	less, lesser	least
bad	worse	worst
far	farther	farthest
many, much	more	most
ill	worse	worst

Now, try your hand at using the correct form. You are given the positive degree of the adjective or adverb; decide whether the comparative or superlative degree is appropriate.

1. I feel much ____________________ that I did yesterday. (good)

2. Of all the members of the baseball team, I ate the ___________ pizza. (much)

3. Memphis is ________________ from Nashville than Chattanooga. (far)

4. I feel the __________ today that I have all week. (good)

5. Of Dallas, Santa Fe, and Los Angeles, Los Angeles is the ___________________ from Nashville. (far)

6. John ate the _____________ cookies of any child in his kindergarten class (many).

7. Of Pete Sampras and Andre Agassi, who is the ______________ player? (good)

8. Which is the ______________ of the two evils? (little)

9. Sandy sings well, but Jim sings even ________________; however, Allison sings the _____________ of all. (well)

10. Robert is the _____________ liar I have ever seen. (bad)

KEY TO EXERCISE ON IRREGULAR COMPARISONS

1. better
2. most
3. farther
4. best
5. farthest
6. most
7. better
8. lesser
9. better, best
10. worst

WRITING PARAGRAPHS

Mick Magoogan, Head Administrator at Major City Resident Hospital, attested to the fact that being a Certified Nurse Technician is a hard job because Certified Nurse Technicians do all the thankless tasks. Write a brief paragragh which outlines what these thankless tasks are.

WRITING PARAGRAPHS

Although Mike Mulligan's job pays only a little more than minimum wage, he truly loves what he does and does his job with pride. Write a paragraph explaining why every job is important to the smooth functioning of any institution; also, why should a person have pride in their job performance, regardless of the pay they receive for that job?

VOCABULARY

Fill in the blanks in the sentences with the words below.

prognosis stoic ghastly immense humidity

1. The ________________ size of the lottery caused many people to purchase tickets last week.

2. When the child was given his immunizations, he was amazingly ___________.

3. During the summer months, __________________ is often particularly high.

4. Because of advances in medical research, the _________________ for many cancer victims is considerably better than in the past.

5. The scene of the Oklahoma City federal building bombing was truly ________________.

rigorous survive attributed glinted brink

1. As the mountain climber hung on with one hand, he knew he was on the _____________ of death.

2. Military recruits must undergo _____________________ physical training.

3. Many successful people have ___________________ their success to good parents who grounded them in solid values.

4. How many AIDS victims __________________ longer than ten years?

5. Elizabeth's hair _______________ in the sunlight.

KEY TO VOCABULARY: FILL IN THE BLANKS

1. immense
2. stoic
3. humidity
4. prognosis
5. ghastly

1. brink
2. rigorous
3. attributed
4. survive
5. glinted

SUFFIXES

Suffixes are endings added to base or root words. In "The Rotten Braten," the word *rigorous* consists of the base or root word *rigor* plus the suffix *-ous*. Whereas prefixes change the meanings of root word, suffixes change the part of speech of the word.

There are several rules relating to suffixes.

(1) Drop a final *e* before a suffix beginning with a vowel.
Examples: combine + -ation = combination
bride + -al = bridal
argue + -ing = arguing

(2) Retain the final *e* before a suffix beginning with a consonant:
Examples: sure + ly = surely
place + ment = placement
hope + ful = hopeful
Some exceptions to note: *truly*, *ninth*, *wholly*, *awful*, *acreage*, *duly*, *likable*

Also, note that to keep the sound of *ce* and *ge*, do not drop the final *e* before *-ous* or *-able*

Examples: *noticeable*, *courageous*, *manageable*

(3) If a final *y* is preceded by a consonant, change the *y* to *i* before adding a suffix.
Examples: country - countries
modify - modified
noisy - noisiest
defy - defies
Note, however, that the *y* does not change to *i* if the suffix begins with an *i*, as in *-ing*. Hence, apply + ing = applying.
If a word ends in a *y* preceded by a vowel does not change to *i*.
Example: stay + ed = stayed

(4) Do not drop a final *l* before *-ly*.
Examples: real + ly = really
cool + ly = coolly

APPLYING THE RULES: Apply the rules to the following words.

1. desire + -able = ______________________
2. continue + -ous = ______________________
3. illegal + -ly ______________________
4 prime + -ary = ______________________
5. rude + -ness = ______________________
6. notice + -able = ______________________
7. true + -ly = ______________________
8. usual + -ly = ______________________
9. formal + -ly = ______________________
10. hurry + -ed = ______________________
11. spray + -ed = ______________________
12. busy + -ier = ______________________
13. safe + -ty = ______________________

14. receive + er = ________________________
15. courage + -ous = ________________________

KEY: SUFFIXES

1. desirable
2. continuous
3. illegally
4. primary
5. rudeness
6. noticeable
7. truly
8. usually
9. formally
10. hurried
11. sprayed
12. busier
13. safety
14. receiver
15. courageous

SPELLING RULES: IE AND EI

Put _i_ before _e_ except after _c_, or when the sound is _a_ as in _neighbor_ and _weight_.

Examples: _i_ before _e_: believe, niece, shield

except after _c_: receive, ceiling, deceit

sounded like _a_: rein, weigh, veil

Exceptions to the rule: either, neither, height, leisure, weird

Exercise: Place _ie_ or _ei_ in the spaces below.

1. fr___ght

2. s___ve

3. pr___st

4. n___ce

5. bel___f

6. rec___pt

7. w___rd

8. y___ld

9. p___ce

10. conc___ve

11. ch___f

12. br___f

13. rec___ve

14. c___ling

15. bes___ge

KEY TO IE, EI EXERCISE

1. freight
2. sieve
3. priest
4. niece
5. belief
6. receipt
7. weird
8. yield
9. piece
10. conceive
11. chief
12. brief
13. receive
14. ceiling
15. besiege

WRITING A REPORT ON AN INVESTIGATION

You are an inspector for Health Services and visit Herr Messerschmitt's restaurant, the Hoffbrau Haus. In approximately half a page to a whole page, write your observations in terms of food handling practices that may have contributed to Detective May's bout with food poisoning.

POSTING RULES FOR RESTAURANT EMPLOYEES

You are Herr Messerschmitt, and you have decided to, shall we say, "clean up your act." Consequently, you are posting at strategic places in the kitchen and other employee work areas a list of rules relating to food handling to remind your employees of the importance of following these rules at all times. Write a list of rules which you think are most important for restaurant employees to follow.

WRITING A COMPLAINT LETTER

You are Detective May and want to inform Herr Messerschmitt, the owner of the Hoffbrau Haus, that you suffered a case of food poisoning as a result of a visit to his restaurant. You simply want to apprise him of this and to express that you hope he will take the necessary steps to correct the situation. Remember that a business letter has your street address, city and state and zip code, and the date in the upper righthand corner. The address of the business you are writing, the inside address as it is called, consists of Herr Messerschmitt, the Hoffbrau Haus, 1402 Braten Lane, Nashville, Tennessee 37206; this is placed at the lefthand margin. A colon (:) follows the salutation (Dear Herr Messerschmitt. Remember to indent your paragraph(s). Your complimentary close consists of "Very truly yours," followed by a signature; the complimentary close lines up with your street address.

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RESPONDING TO A CUSTOMER COMPLAINT

You are Herr Messerschmitt who is responding to Detective May's complaint letter. You, of course, say that you are sorry for Detective May's illness and assure him that you are taking every step possible to rectify the situation. You might specifically state what you are doing to improve the conditions at The Hoffbrau Haus. You probably should refund the money for his dinner or invite him back for a free dinner.

VOCABULARY: FILL IN THE BLANKS

Use the following words in the sentences below:

sickly morgue reprimanded intimidated sanctuary scrupulous

1. Dr. Mayberry frequently ______________________ members of the Housekeeping Staff when hospital rooms were not properly cleaned before a patient was moved in.

2. In fact, most members of the Housekeeping Staff were quite ______________________ about doing their work well.

3. Often both the odors and the institutional colors used in a hospital are _______________.

4. Dead bodies are taken to the __________________ for identification or burial purposes.

5. In today's busy, stress-filled world, our homes often provide us with a __________________.

6. Even though the ringleader of the Housekeeping Staff was a "big man with the bulging arms of Charles Atlas," Inspector March was not _________________________.

allotted contribution notify intriguing schedule concept

1. An employee should ____________ his or her employer in writing when he or she decides to resign for any reason.

2. The Housekeeping Staff was actually making a valuable ______________________ to the hospital.

3. Often the doctors and nurses did not follow the ________________.

4. Each hospital room had to be cleaned in an ________________ amount of time.

5. Inspector March thought that the fact that the Housekeeping Staff was forced to be mind readers because of the unreliable nature of the hospital's schedule was an interesting _____________.

6. The continuing problems at Mercy Memorial Hospital are certainly ________________.

KEY: VOCABULARY FILL IN THE BLANKS

1. reprimanded
2. scrupulous
3. sickly
4. morgue
5. sanctuary
6. intimidated

1. notify
2. contribution
3. schedule
4. allotted
5. concept
6. intriguing

VOCABULARY

MATCHING: Match the words on the left with their definitions on the right.

________1. pun

________2. tersely

________3. bulging

________4. unsolicited

________5. stuffy

________6. hollow

________7. scrupulous

________8. chaos

________9. metaphorically

_______10. sanctuary

A. Not asked for

B. Total disorder or confusion

C. Any place of refuge or safety

D. Not literally

E. Sticking out; protruding

F. A play on words

G. Precise; exacting; conscientious

H. Directly; concisely

I. Not solid; empty

J. Airless; close; poorly ventilated

KEY: VOCABULARY MATCHING

1. F
2. H
3. E
4. A
5. J
6. I
7. G
8. B.
9. D
10. C

SPELLING RULES: DOUBLING THE FINAL CONSONANT

You might have noticed that the word allotted adds a "t" to allot before adding the suffix ed. A suffix is simply a word part that is added to the end of a root or base word in order to change its meaning. Thus, allot is a base word whereas ed is the suffix.

There are specific rules to let you know when to double the final consonant of a word before adding a suffix.

1. In words of one syllable only, the base word must end with a consonant with only one vowel in front of it. Note these examples:

rap + er = rapper
grim + est = grimmest

However,

droop + ing = drooping

2. Two conditions must be met in two-syllable words. The word should still end with a final consonant with only one vowel in front of it; however, in addition to this, the stress or accent should fall on the second syllable. Both of these conditions must be met with two-syllable words.

Examples: admit + ance = admittance
repel + ent = repellent

ASSIGNMENT: Try your hand with the following words. Don't forget the rules!

1. control + er = ______________________
2. appear + ance = _____________________
3. hop + ing = ________________
4. hot + er = _________________
5. plan + ing = _______________
6. clean + er = _______________
7. stop + ed = _______________
8. sun + y = __________________
9. occur + ence = ______________________
10. read + ing = ________________
11. propel + er = ________________
12. jog + er = ________________

KEY: DOUBLING THE FINAL CONSONANT

1. controller
2. appearance
3. hopping
4. hotter
5. planning
6. cleaner
7. stopped
8. sunny
9. occurrence
10. reading
11. propeller
12. jogger

WRITING A WANT AD

Write a job description appropriate for a newspaper want ad for a housekeeping job at Mercy Memorial Hospital. In addition to the cleaning duties which you can describe in some detail, what characteristics would an employer want in a housekeeping employee? For example, a housekeeping employee should be self-directed or self-motivated because he or she is usually not under direct supervision most of the time. Think of other specific adjectives (words that describe) that would characterize a good housekeeping emoloyee. At the end, you should provide Dr. Margaret Mayberry's name and a telephone number.

WANT AD:

WRITING A MEMO

Just after Dr. Mayberry met with Inspector March, she sent a memo or short business communication to all doctors, nurses, the Housekeeping Staff and the Service Associates to call a meeting on Thursday, December 7, 1996, to discuss making improvements in the hospital schedule. Memos should include the date they are sent, to whom they are sent, from whom they are sent, and the reason for the memo (indicated by Re:) followed finally by a brief message communicating the message. Write a brief memo using the above information.

[Date]

TO:

FROM:

RE:

WRITING A LETTER OF REPRIMAND FOR AN EMPLOYEE FILE

Shortly before Inspector March helped to solve the scheduling problem at Mercy Memorial Hospital, the hospital administrator, Dr. Margaret Mayberry, wrote a brief letter of reprimand to be placed in the employee file of Mr. Mike Moore accusing him of not cleaning Room 303 properly. Write a brief letter to Mr. Mike Moore, Housekeeping Staff, dated November 15, 1996, informing him that he is being reprimanded officially for the reason just stated above.

[Date]

Dear ________________:

____

____

____

____

____

____

____

____

Sincerely,

[Name]
[Job Title]

THINKING AND WRITING ABOUT THE WORKPLACE

Dr. Mayberry admits that she thought that it was unfair that the "people with the least amount of control over the schedule should suffer the most when something in it changed." Inspector March points out that the reprimand system is bad in this instance because working adults like to feel that they are part of a team and that they are making a valuable contribution on the job.

What do you think makes a good employer? What can an employer do to make his or her employees both more productive and happier in the workplace? Write a brief paragragh stating your thoughts on these issues. Try to make at least 3 or 4 suggestions or recommendations.

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NOUNS

A noun is the name of a person, place, thing, or an idea or concept. The articles a, an, and the are sometimes called "noun markers" because they signal that a noun is coming up soon in the sentence. Proper nouns are the names of specific persons, places, or things and begin with capital letters. In the episode "The Mystery of the Misplaced Mama," Inspector March, Mercy Memorial Hospital, and Dr. Margaret Mayberry are examples of proper nouns. Nouns that name any of a class, not a particular one, are called "common nouns." Most nouns are common nouns.

Nouns that are concepts or ideas are often more difficult for students to recognize. Some examples include love, greed, honesty, efficiency, hour, inch, term, and democracy.

When a noun comes in front of a another noun, it is no longer a noun, but an adjective modifying or describing that noun. An example would be bus in bus stop. Bus, although ordinarily a noun, is an adjective here, modifying the noun stop.

In the following passage, underline each noun, common or proper.

The call came in at 0900 hours. A man had lost his mother at Mercy Memorial Hospital. I expressed my condolences and asked where I could send some flowers. But that only made me more emotional. No, he told me, his mother wasn't dead. She was lost. As in, gone, As in, missing. As in, no one knew where the H-E-Double Hockey Sticks she was. As in, you get my drift.

I asked him how long she had been missing. He said 48 hours. I did a quick calculation and decided there wasn't a minute to lose.

My name is March. Inspector March. I'm a cop.

(Hint: There are seventeen nouns in this passage. A person's name or a person's name and title count as one noun. Examples: Governor Don Sundquist or Mayor Phil Bredesen. Similarly, Tennessee State University would also count as one noun.)

KEY: NOUNS

The call in at 0900 hours. A man had lost his mother at Mercy Memorial Hospital. I expressed my condolences and asked where I could send some flowers. But that only made him more emotional. No, he told me, his mother wasn't dead. She was lost. As in, gone. As in, missing. As in, no one knew where the H-E-Double Hockey Sticks she was. As in, you get my drift.

I asked him how long she had been missing. He said 48 hours. I did a quick calculation and decided there wasn't a minute to lose.

My name is March. Inspector March. I'm a cop.

TYPES OF SENTENCES AND END PUNCTUATION

There are four basic types of sentences. The declarative sentence makes a statement or states a fact and always ends with a period (.). The interrogative sentence asks a question and always ends with a question mark (?). Do not confuse an interrogative sentence with an indirect question. Note the following example: I asked her what time we should arrive at the party. This sentence is stating a fact, not asking a question. The exclamatory sentence indicates strong emotion or urgency and always ends with an exclamation point (!). Some exclamatory sentences begin with how or what, but they should not be confused with questions or interrogative sentences. Note these examples: How angry he was! What a beautiful day it is today! An imperative sentence is a command or a request and is usually followed by a period, but if it indicates strong emotion or urgency, it is followed by an exclamation point. Imperative sentences are easy to recognize because their subject is always the understood or implied you; thus, they often begin with a verb: Give me your name, address, and social security number. Call me tomorrow. Leave a message at the beep. Close the door. Abandon ship! Shut up!

ASSIGNMENT: Now, try your hand at punctuating the different kinds of sentences. Here are ten sentences for you to provide with end punctuation.

1. How lucky you were to win the lottery

2. What year were you born

3. Thomas Jefferson was the third President of the United States

4. Open your textbooks, class

5. What an interesting play that was last night

6. Mary asked me for an opinion on her paper

7. The tornado is coming at us now

8. I am sorry that you are not feeling well today

9. Watch out for those falling rocks

10. Where is Edgar Allan Poe buried

KEY TO END PUNCTUATION

1. How lucky you were to win the lottery!

2. What year were you born?

3. Thomas Jefferson was the third President of the United States.

4. Open your textbooks, please.

5. What an interesting play that was last night!

6. Mary asked me for an opinion on her paper.

7. The tornado is coming at us now!

8. I am sorry that you are not feeling well today.

9. Watch out for those falling rocks!

10. Where is Edgar Allan Poe buried?

VOCABULARY

Match the vocabulary words on the left with the definitions on the right.

______1. administrator

______2. attractive

______3. regulations

______4. sterile

______5. trio

______6. empty

______7. frantic

______8. mercy

______9. thrilling

_____10. whereabouts

_____11. crowd

_____12. glint

A. many people gathered together

B. exciting

C. pleasing in appearance

D. quick flash of light

E. laws or rules

F. manager

G. compassion or kindness

H. wild with emotion; anxious

I. germ-free

J. vacant; unoccupied

K. location of a person or thing

L. a group of three

KEY: VOCABULARY MATCHING

1. F.
2. C.
3. E.
4. I.
5. L.
6. J.
7. H.
8. G.
9. B.
10. K.
11. A.
12. D.

VOCABULARY

Exercise 1: Fill in the blanks in the sentences below with the following vocabulary words:

condolences allergy gurney exaggeration hysterical

1. Mrs. Morganfield has a serious wheat _______________.

2. Inspector March says that he sneaked out of the hospital by taking the service elevator and lying on a ______________.

3. When Mr. Morganfield thinks his mother has been kidnapped, he becomes ____________________.

4. Expressions of sympathy, as Inspector March expresses when he is told that Mr. Morganfield has lost his mother, are __________________.

5. Dr. Mayberry thinks that Mr. Morganfield's fears that his mother may be in great danger is a bit of an _________________.

Exercise 2: Same instructions as above.

arrest episode appropriate coincidence emergency

1. When someone commits a serious crime, we expect a policemam to ______________ him or her.

2. Being loud, telling jokes, and running around would not be considered __________________ behavior at a funeral home.

3. When someone stops breathing, it is certainly an __________________.

4. A single show of a television series is an _____________.

5. It is certainly no ______________________ that lazy people are seldom successful.

KEY: VOCABULARY

Exercise 1

1. Mrs. Morganfield has a serious wheat allergy.

2. Inspector March says that he sneaked out of the hospital by taking the service elevator and lying on a gurney.

3. When Mr. Morganfield thinks his mother has been kidnapped, he becomes hysterical.

4. Expressions of sympathy, as Inspector March expresses when he is told that Mr. Morganfield has lost his mother, are condolences.

5. Dr. Mayberry thinks that Mr. Morganfield's fears that his mother may be in great danger is a bit of an exaggeration.

Exercise 2

1. When someone commits a serious crime, we expect a policeman to arrest him or her.

2. Being loud, telling jokes, and running around would not be considered appropriate behavior at a funeral home.

3. When someone stops breathing, it is certainly an emergency.

4. A single show of a television series is an episode.

5. It is certainly no coincidence that lazy people are seldom successful.

WRITING A JOB DESCRIPTION

You have been instructed by your employer at Mercy Memorial Hospital to write a job description for a service associate like Sean McLaughlin. List the necessary qualifications and duties of a service associate at Mercy Memorial Hospital.

TAKING TELEPHONE MESSAGES

You are the person answering the phone at Mercy Memorial Hospital when Mr. Morganfield calls to report that his mother is missing. Your message should include the time, the person calling, and the message, including how long Mrs. Morganfield has been missing. Write the message below.

WRITING A MEMO

Memos (short for memorandum) are often used to communicate within a company or business; they are typically brief and include the following information: the date of the memo, to whom it is sent, the person who is sending the memo, and the subject, followed by the information provided by the sender. Although the order may differ somewhat from company to company, the following provides a sample of a typical memo:

September 30, 1996

TO: Members of the day nursing staff

FROM: Dr. Margaret Mayberry

RE: Meeting to discuss new room assignment procedures

There will be a brief meeting of the day nursing staff at 6:00 a.m., Tuesday, October 1, 1996, to discuss new room assignment procedures because of a recent incident when a patient was temporarily "lost." The meeting will be held in the staff room.

ASSIGNMENT: Write a memo using today's date to all service associates at Mercy Memorial Hospital from Dr. Margaret Mayberry. The memo is in regards to (Re:) meeting the new service associate recently hired by the hospital. The meeting will take place the day following the date of the memo in Room 200B; service associates will be introduced to the new service associate, Mr. Kent Montgomery.

WRITING A BUSINESS LETTER

Business letters basically consist of six parts: the heading, the inside address, the salutation, the body, the complimentary close, and the signature. The heading is in the upper righthand corner of the paper and consists of one's street address on the first line, one's city, state and zip code on the second line, and the date the letter is written on the third line.

The inside address may consist of three or four lines. If you know the person to whom you are writing or his or her title, this should go on the first line of the inside address. The inside address begins on the left side of the paper after you have skipped a line after the heading. Next follows the name of the business or organization to which you are writing. On the third line is the street address of the business or organization. On the final line is the city, state, and zip code of the company.

The saluation consists of the person's name (if you know it); if you do not know a person's name or just know his or her title, you may simply use "Dear Sir or Madam"; the saluation of a business letter is always followed by a colon (:).

The body of a business letter consists of what you are writing about to the company, whether it be a letter of application, a complaint letter, a letter of resignation, and so forth. Paragraphs should be indented; you should skip a line between paragraphs. The body of a business letter should be as concise as possible.

The complimentary close appears after the body of the letter and in line with the heading on the righthand side of the paper. Choices for the complimentary close include "Sincerely," Sincerely yours," "Yours truly," or "Very truly yours" and should always be followed by a comma. Note that only the first word of the complimentary close is capitalized.

It is preferable for business letters to be typed, if possible. Consequently, under the complimentary close should come one's handwritten signature (first and last names, middle initial, if desired), followed by your name typed below the signature.

[SAMPLE BUSINESS LETTER]

1512 Meadowlark Lane
Nashville, Tennessee 37206
September 25, 1996

Dr. Richard Sparkman
Mercy Memorial Hospital
1734 Winding Way
Murfreesboro, Tennessee 37130

Dear Dr. Sparkman:

I am writing to apply for the position of Medical Records Clerk. I received an associate degree in medical records in May 1994, from Marchetti Medical College. I have worked for the past two years at Methodist Hospital in Memphis, Tennessee, but have since moved to Nashville and am looking for a job here. References will be provided upon request.

Thank you very much for your assistance and consideration.

Sincerely,

Marsha M. Jones

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ASSIGNMENT: WRITING A BUSINESS LETTER

You wish to apply for a position as a Service Associate at Mercy Memorial Hospital. Address the letter to Dr. Margaret Mayberry, Mercy Memorial Hospital, 1734 Winding Way, Murfreesboro, Tennessee 37130. You should state your interest in this particular position, your education and experience, and relate how you think you are particularly suited for this job. Be sure to close the body of your letter by expressing thanks for the person's time.

VOCABULARY

MATCHING: Match the words on the left with their definitions on the right.

_________1. pilfered
_________2. inventory
_________3. commercial
_________4. shipping
_________5. receiving
_________6. efficient
_________7. cluttered
_________8. logic
_________9. customer
_________10. cannibalize
_________11. verified
_________12. bickering

A. disordered, filled with junk
B. stole a small item or amount
C. determined the truth or accuracy of
D. the business or act of transporting or delivering goods
E. valid reasoning
F. to remove usable parts from machines to repair other equipment
G. producing effective work with a minimum of effort
H. merchandise or stock on hand
I. engaging in a petty or trivial quarrel or squabble
J. a person who buys goods or services from another
K. the buying and selling of goods; trade
L. the accepting of purchased goods

KEY TO VOCABULARY: MATCHING

1. B.
2. H.
3. K.
4. D.
5. L.
6. G.
7. A.
8. E.
9. J.
10. F.
11. C.
12. I.

Now, let's try using some of these words in sentences.

customer ____

inventory ____

efficient ____

shipping ____

commercial ____

VOCABULARY

MATCHING: Match the vocabulary words on the left with their definitions on the right.

_______1. stockroom	A. to enter or write in a record
_______2. missing	B. by hand
_______3. embarrassing	C. to fix; to restore to working condition
_______4. routing	D. a sloppy, messy, untidy person
_______5. repair	E. a room in which goods are kept
_______6. log	F. causing one to be ill at ease, uncomfortable
_______7. deduct	G. high-priced, costing a lot of money
_______8. error	H. to subtract, to take away a quantity from another
_______9. expensive	I. lost, absent, missing
_______10. slob	J. showed, displayed
_______11. manually	K. a mistake, something done incorrectly
_______12. exhibited	L. forwarding, sending, scheduling on a series of stops

KEY TO VOCABULARY: MATCHING

1. E.
2. I.
3. F.
4. L.
5. C.
6. A.
7. H.
8. K.
9. G.
10. D.
11. B.
12. J.

Now, let's try using some of these words in sentences.

manually ____

____

____

error ____

____

____

expensive ____

____

____

repair ____

____

____

deduct ____

____

____

USING SEMICOLONS

A semicolon (;) is used to join two related sentences when they are not connected by the conjunctions (connecting words) and, but, for, so, and yet or when each sentence is not punctuated with a period. If the two sentences have between them the transitional words however, consequently, thus, nevertheless, therefore, in fact, and so forth, the semicolon comes before the transitional word(s) with the transitional word being followed by a comma.

Note the following examples:

I studied Spanish in high school; however, I studied French in college.

The concert begins at 7:00; the fireworks begin at 9:00.

I got up late this morning; nevertheless, I arrived at work on time.

Now, try using semicolons in the sentences below.

1. Exercise is excellent for relieving stress it is also good for reducing high blood pressure and increasing one's metabolic rate.

2. John has great speaking ability in fact he has won many awards in forensics.

3. New Orleans is a unique city its heritage includes many different cultures.

4. I have just received a job promotion thus I also have an increase in responsibility.

5. William Faulkner is my favorite American novelist Wallace Stevens is my favorite American poet.

KEY TO EXERCISE ON SEMICOLONS

1. Exercise is excellent for relieving stress: it is also good for reducing high blood pressure and increasing one's metabolic rate.

2. John has great speaking ability; in fact, he has won many awards in forensics

3. New Orleans is a unique city; its heritage includes many different cultures.

4. I have just received a job promotion; thus, I also have an increase in responsibility.

5. William Faulkner is my favorite American novelist; Wallace is my favorite American poet.

WRITING PARAGRAPHS

Mr. Martin has a quite complicated job at the phone company. Write a paragraph based on the details in the episode which tells what Mr. Martin's responsibilities are. Remember to begin with a topic sentence which is general in nature; then, supply the details. Don't forget to indent about five spaces for the first sentence.

PARAGRAPH 1

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WRITING JOB DESCRIPTIONS

Write a brief job description for Jake, the Inventory Clerk.

WRITING MEMOS

A memo, short for memorandum, is a relatively short message sent from one person to other people in an organization. It is less formal than a letter. Note that the subject line makes the memo's purpose clear immediately. Also, note that details such as time and place of a meeting are not buried in a paragraph but are listed separately.

Write a memo using the format below. The date can be today's date. The memo should be to the Inventory Staff from Mr. Martin, Supervisor. The subject should be the inventory of the stockroom. The memo states that there will be a meeting in the stockroom on May 1, 1997, to manually inventory every item in the stockroom. Furthermore, there will be a training session after the inventory is completed on proper stockroom storage techniques.

MEMO

Date:

To:

From:

Subject:

[MEMO]

Time:

Place:

WRITING A LETTER OF APPLICATION

A letter of application (or cover letter) introduces the applicant to the potential employer and often highlights information on an accompanying resume. The purpose of an application letter is to be invited by the employer for an interview. In the salutation, you should address a specific person. If you do not know a specific person's name, you may address the letter to the Personnel Manager. In the introductory paragraph, state the job for which you are applying and where you found out about the job. State your main qualification for the job. In the body or second paragraph, let the employer know how your qualifications can meet the needs of his business. In the third paragraph or conclusion, ask for an interview; you might state the times when you are available and of course, your telephone number. Thank the employer for his time and consideration.

Write a letter to Mr. John Campbell, Campbell's Buick and Pontiac, 360 Main Street, Arlington, VA 46739, applying for the position of auto repair technician. Cite previous experience.

[Your address]

[Address of employer]

Dear :

__________________ [Complimentary close]

[Your signature]

VOCABULARY

MATCHING: Match the vocabulary words on the left with their definitions on the right.

_______1. humidity
_______2. crusty
_______3. geriatric
_______4. hilarious
_______5. obtuse
_______6. clueless
_______7. pummel
_______8. deduction
_______9. abduction
_______10. alien

A. to beat with the fists
B. pertaining to the medical study of old age
C. dampness in the air
D. a carrying away by force; a kidnapping
E. dull; slow to understand
F. a conclusion based on premises or evidence
G. from a strange or foreign place; from another planet
H. surly, gruff, harsh, stern in manner
I. extremely funny or humorous
J. without any hint or guide to the solution of a problem

KEY TO VOCABULARY: MATCHING

1. C.
2. H.
3. B.
4. I.
5. E.
6. J.
7. A.
8. F.
9. D.
10. G.

Now, let's try using some of these words in sentences.

humidity ______________________________

____

____

deduction ______________________________

____

____

geriatric ______________________________

____

____

hilarious ______________________________

____

____

clueless ______________________________

____

____

VOCABULARY

MATCHING: Match the words on the left with their definitions on the right.

________1. thermos
________2. gladiator
________3. peculiar
________4. shrubbery
________5. muttering
________6. joint
________7. ache
________8. referee
________9. bulk
________10. birthright
________11. obvious
________12. abrasive

A. the major part or largest portion of something
B. the point of connection between bones
C. easily seen or understood; apparent; evident
D. to judge, as in a sporting contest, or to mediate in an dispute
E. an insulated bottle for keeping food and drink hot or cold
F. any privilege given to someone based solely on his or her birth
G. having a tendency to cause annoyance or ill will; harsh; rough
H. unusual; strange; odd; queer
I. complaining or grumbling in low tones
J. a dull, steady pain
K. a person trained to fight professionally in mortal combat for entertainment in the ancient Roman arena
L. a planting of shrubs, which are low, woody plants which have several stems instead of a single trunk, as trees do

KEY TO VOCABULARY: MATCHING

1. E.
2. K.
3. H.
4. L.
5. I.
6. B.
7. J.
8. D.
9. A.
10. F.
11. C.
12. G.

Now, let's try using some of these words in sentences.

muttering ______________________________

obvious ______________________________

peculiar ______________________________

ache ______________________________

thermos ______________________________

LATIN ROOTS

Many of the words in English derive from Latin roots. Knowing the meaning of these roots can help you figure out the meaning of many words. Study the Latin roots below.

ROOT	MEANING	EXAMPLES
-clin	lean, bend	decline, recline
-clud, -clus	shut, close	include, exclusive
-cur	care	cure, curator, curate
-cur, -curs	run	current, cursive
-dict	say	dictionary, dictator dictate
-man	hand	manufacture, manual manicure
-pos, -pot	strong, powerful able	posse, potent, potential
-spec, -spect, -spic	see, look	speculate, spectator, conspicuous
-vid, -vis	see, sight	video, vision, visionary
-vol	wish, will	voluntary, volunteer

VOCABULARY: LATIN ROOTS

MATCHING: Match the following Latin roots with their meanings.

_______1. -man

_______2. -vid,-vis

_______3. -dict

_______4. -clin

_______5. -vol

_______6. -pos, -pot

_______7. -spec, -spect

_______8. -cur

_______9. -curs

_______10. -clud, -clus

A. see, look

B. will, wish

C. run

D. strong, powerful, able

E. shut, close

F. hand

G. say

H. see, sight

I. lean, bend

J. care

KEY TO EXERCISE ON LATIN ROOTS

1. F.
2. H.
3. G.
4. I.
5. B.
6. D.
7. A.
8. J.
9. C.
10. E.

GREEK ROOTS

There are many words in English which derive from Greek roots. Below are some common Greek roots used in English words.

ROOT	MEANING	EXAMPLES
-arch	first, chief	archangel, monarch archaeology
-astr, -aster	star	astrology, astronomy asteroid
-dox	praise, thinking	doxology, paradox, orthodox
-gen	race, kind, born	genealogy, generation genetic, regenerate
-geo	earth	geography, geology
-soph	wise	philosophy, sophisticated

VOCABULARY: GREEK ROOTS

MATCHING: Match the Greek roots on the left with their meanings on the right.

________1. -geo	A. race, born, kind
________2. -arch	B. wise
________3. -soph	C. think, praise
________4. -dox	D. first, chief
________5. -gen	E. earth
________6. -astr, -aster	F. star

KEY TO EXERCISE ON GREEK ROOTS

1. E.

2. D.

3. B.

4. C.

5. A.

6. F.

VOCABULARY: PREFIXES

MATCHING: Match the prefixes on the left with their meanings on the right.

________1. re- A. around

________2. extra- B. good

________3. hyper- C. between

________4. eu- D. within

________5. post- E. beyond

________6. inter- F. over, excessive

________7. circum- G. again

________8. intra- H. after

PREFIXES

Remember that prefixes are meaningful word groups that are attached to the beginnings of base or root words. Keep in mind that when you add a prefix to a root word, you simply add. It is not necessary to leave out letters. Study the following common prefixes.

PREFIX	MEANING	EXAMPLES
circum-	around	circumference, circumscribe, circumlocute, circumspect
eu-	good	euphony, eugenics
extra-	beyond	extraterrestrial, extrasensory, extracurricular
hyper-	over, excessive	hypersensitive, hyperactive hypertension
intro-, intra	within	intramural introvert
inter-	between	international interstate
post-	after	postscript postmortem posthumous
re-	again	regain renew recreate

KEY TO EXERCISE ON PREFIXES

1. G.
2. E.
3. F.
4. B.
5. H.
6. C.
7. A.
8. D.

WRITING PARAGRAPHS

Being a Nurse Technician at Major City Retirement Hospital, as is Mike Mulligan, is quite obviously a difficult demanding job. Based on the details in the episode, write a paragraph describing the duties and responsibilities of a Nurse Technician.

PARAGRAPH 1

WRITING PARAGRAPHS

Inspector March is not a very good guest at the Major City Retirement Hospital. Write a paragraph detailing the things which Inspector March does which irritate Mike Mulligan, the Nurse Technician. Explain why manners and consideration of other people are so important in our daily interactions.

PARAGRAPH 2

VOCABULARY: MATCHING

______1. taciturn
______2. disgruntled
______3. nearsighted
______4. unsavory
______5. demeaning
______6. sleuthing
______7. self-effacing
______8. hearsay
______9. outrage
______10. evasion
______11. travesty
______12. promotion

A. avoidance of something by being tricky or deceitful
B. having a tendency to be untalkative or uncommunicative
C. unpleasant; disgusting, especially in a moral sense
D. an advancement in responsibility and rank on a job
E. in a disagreeable mood; discontented
F. an act that is offensive to morality or decency
G. an exaggerated imitation that has as its purpose to mock or make fun of
H. rumor; somethhing heard but not actually known to be true
I. degrading; humbling; lowering in status
J. humble; modest; tending not to draw attention to oneself
K. able to see well up close, but not at a distance
L. to act as a detective would; snooping around

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KEY TO VOCABULARY: MATCHING

1. B.
2. E.
3. K.
4. C.
5. I.
6. L.
7. J.
8. H.
9. F.
10. A.
11. G.
12. D.

VOCABULARY: MATCHING

______1. off color
______2. mime
______3. cabaret
______4. innocent
______5. delegated
______6. barging
______7. complaint
______8. uphold
______9. custom
______10. appetizer
______11. won-ton
______12. strict

A. to maintain or promote in the face of a challenge
B. habit; something one usually does
C. not permissive; rigid; kept within narrow bounds
D. improper; in poor taste; indecent
E. without evil; having no danger or harm
F. food or drink served before the meal to stimulate the appetite
G. a restaurant with live entertainment containing of short acts
H. authorized someone else to do a job or take on a responsibility or duties
I. a expression of dissatisfaction
J. a Chinese food consisting of noodle dough filled with fish, meat, or vegetables, either fried or boiled
K. a performer who uses gestures and movements without using the voice
L. entering or coming into rudely or suddenly

KEY: VOCABULARY: MATCHING

1. D.
2. K.
3. G.
4. E.
5. H.
6. L.
7. I.
8. A.
9. B.
10. F.
11. J.
12. C.

USING HYPHENS

The hyphen (-) is used to convey the idea of a unit, to avoid misunderstanding, and to divide words at the end of a line. In "The Unfit Fitness Report," the words "self-effacing, "razor-sharp," "self-centered," and "life-blood" are examples. Note the following rules which apply to the use of hyphens:

(1) Hyphenate two or more words which serve as a single adjective before a noun.

Examples: a well-written novel
a first-class performance
a mass-produced item
a ten-year-old boy

But, a novel that is well written
a performance that is first class
an item that is mass produced
a boy who is ten years old

Also, note that in a series hyphens should be carried from one item to the next.

Example: sixteenth- and seventeenth-century literature

(2) Hyphens are also used to make a compound of two or more words that function as a single word:

Examples: hand-fed
T-shirt
eye-opener
sister-in-law

(3) Use a hypben to link parts of compound nouns that begin with ex-,all-, great-, and self-, and words that end with the suffix -elect. Also, always hyphenate a prefix which comes before a capitalized.

Examples: all-American
self-esteem
ex-wife
great-grandmother
president-elect
mid-August

(4) Use a hyphen with the numbers twenty-one through ninety-nine.

Examples: forty-one
seventy-nine
twenty-five
ninety-six

(5) Use a hyphen to link the parts of a fraction when they are used as adjectives, but not as nouns.

Examples: two-thirds majority
But, a majority of two thirds

(6) Hyphens are also used in zip codes ending in an additional four digits.

73592-0015

Exceptions: Do not use the hyphen in the following situations:

(1) after an adverb ending in -ly: a highly successful career

(2) when writing chemical terms: a sodium chloride solution
(3) in a compound adjective which uses a comparative or superlative adjective: a better written manual
(4) using a modifier with a letter or numeral as the second term: Type A blood

Now, try your hand at using hyphens. Use hyphens below only as needed; put None if no hyphen is necessary.

1. allAmerican: ______________________
2. unusual: ___________________
3. selfdefense: _______________________
4. exboss: ________________
5. undeniable: _____________________
6. unAmerican: _____________________
7. preschool: _____________________
8. interchangeable: _________________________
9. a beautifully drawn portrait: ___________________________________
10. a well written speech: _________________________________
11. a make it happen attitude: ____________________________
12. my great great grandfather: _________________________________
13. turn of the century history: __________________________________
14. thirst quenching drink: ______________________________
15. thirty three men: ______________________________
16. a three day weekend: ___________________________
17. a generally average speech: _________________________
18. nonBritish: ________________________
19. nonparticipating: ___________________________
20. motherinlaw: _____________________________

KEY TO EXERCISE ON HYPHENS

1. all-American
2. None
3. self-defense
4. ex-boss
5. None
6. un-American
7. None
8. None
9. None
10. well-written
11. make-it-happen
12. great-great-grandfather
13. turn-of-the-century
14. thirst-quenching
15. thirty-three
16. three-day
17. None
18. non-British
19. None
20. mother-in-law

ALPHABETIZING

It is often necessary in the workplace to put files, work orders, and other documents into alphabetical order. Items are, of course, filed first by the first letter; if the first letter is the same, as in Alcorn and Atkins, one must move to the second letter. If the first two letters are the same, then one must move to the third letter as in Alcorn and Allen; Alcorn would be first because "c" comes before "l."

Alphabetize the following lists:

Jones
Callis
Smedley
Bedford
Parman
Fuller
Donovan
Gentry

Crutchfield
Cameron
Coleman
Clooney
Calloway
Collins
Collier
Cunard

Delaney
Dalloway
Dahlgren
Dodd
Degrafenreid
Davis
Daniels
Davidson

Shaw
Shannon
Shacklett
Shaffer
Settles
Shackleford
Shapiro
Shadwick

KEY TO ALPHABETIZING

Bedford
Callis
Donovan
Fuller
Gentry
Jones
Parman
Smedley

Calloway
Cameron
Clooney
Coleman
Collier
Collins
Crutchfield
Cunard

Dahlgren
Dalloway
Daniels
Davidson
Davis
Degrafenreid
Delaney
Dodd

Settles
Shackleford
Shacklett
Shadwick
Shaffer
Shannon
Shapiro
Shaw

WRITING PARAGRAPHS

In "The Case of the Unfit Fitness Report," it is Lieutenant Mulgrave, the Morale Officer, who writes the job performance reports, and it is his report on Detective May that causes a great deal of distress. Morale is the mental and emotional condition which relates to people's confidence and eagerness and is very important in the workplace. Although we often think employers are responsible for good or bad morale in the workplace, employees, too, play a part. Think very seriously: what can employers do to increase positive attitudes toward work among their employees? What can employees do to make the workplace a more positive, pleasant, and less stressful environment? Write a paragraph in which you explore the ways both employers and employees can work together to create a better workplace. Remember to indent five spaces on your first sentence. Also, remember to begin with a topic sentence which generally introduces your subject.

RESPONDING TO A POOR JOB PERFORMANCE EVALUATION

When Detective May receives an unfavorable job evaluation from Lieutenant Mulgrave, his friend, Inspector March, comes to the defense of his comrade. He goes to Captain Mims, Lieutenant Mulgrave's supervisor. He also investigates to see what others' evaluations have been. Eventually the dissatisfied employees demand a hearing; their unfair fitness reports are changed, Captain Mims goes back to writing the reports himself, and Lieutenant Mulgrave is demoted. Sometimes an employee is permitted to respond in writing to his job performance evaluation. Suppose that you received a "fitness" report that you felt was less than complimentary. What do you think would be the best course of action for you to take? After the hearing is over, Inspector March admits that perhaps the whole experience could have been avoided if he and Detective May had worked on their communication skills. Write your thoughts, in paragraph form, on the following issues: How would you respond to a poor job evaluation? What ongoing communication should occur between employer and employee to prevent unpleasantness at the time of a job performance review?

Pretest of Math Skills

1. 124 + 17 a. 133 b. 113 c. 141 d. 107

2. 6 × 5 × 0 a. 30 b. 0 c. 25 d. 50

3. 245 ÷ 5 a. 43 b. 16 c. 240 d. 49

4. 300 - 194 a. 196 b. 106 c. 494 d. 151

5. 16 + 17 a. 33 b. 23 c. 62 d. 1

6. 1643 + 302 a. 1945 b. 1341 c. 1864 d. 6445

7. 5/6 - 4/6 a. 2/6 b. 1/6 c. 9/6 or 1 1/2 d. 9/12

8. 2 1/2 + 3 1/2 a. 5 2/4 b. 6 c. 1 d. 6 1/2

9. 43 × 9 a. 34 b. 147 c. 275 d. 387

10. 206 ÷ 1 a. 206 b. 1 c. 0 d. 20

A recipe that serves 10 people calls for 1/2 c. sugar

11. How much sugar is necessary to double the recipe?
a. 2 c. b. 1/4 c. c. 1 c. d. 3/4 c.

12. How much sugar is necessary to serve 5 people?
a. 1/4 c. b. 2 c. c. 3/4 c. d. 1 c.

Weight of shapes & scale

■ = 2 pounds ▲ = 1 1/2 pounds ● = 3 pounds

▲▲■● = ________

13. How many square weights are necessary to balance the scale?
a. 2 b. 4 c. 3 d. 1

14. One circle weight is the equivalent of _______triangle weights.
a. 1 b. 2 c. 4 d. 3

15. Three squares is equal to two _______.
a. triangles b. squares c. circles d. rectangles

16. How much time has elapsed from 7:45 am until 2:10 pm?
a. 6 hrs. 25 min. b. 6.5 hours c. 5 hrs. 35 min. d. 17 hrs. 35 min.

17. An alarm clock snooze cycle lasts 9 minutes. How many "snoozes" are there in 45 minutes?
a. 5 b. 6 c. 4 d. 7

18. A case of cola costs $5.35 and contains 24 cans. What is the approximate cost of each can?
a. 24¢ b. 22¢ c. 64¢ d. 38¢

19. If a baby eats 4 jars of baby food each day. How many jars are eaten in a 10 day period?
a. 44 b. 14 c. 40 d. 28

20. How many yards are there in one mile? 1 mile = 5280 feet and 1 yard = 3 feet
a. 988 b. 440 c. 15840 d. 1760

Math Skills Review I

1. 63 - 21
2. 214 ÷ 2
3. 6 + 12
4. 222 - 111
5. 2 + 8
6. 123 + 42
7. 2 × 2
8. 15 - 7
9. 369 ÷ 9
10. 5 × 7
11. 8 - 7
12. 10 × 11
13. 5 + 5 + 5
14. 16 + 72
15. 81 ÷ 9
16. 2 ÷ 1
17. 4 - 4
18. 9 × 3
19. 48 - 35
20. 72 ÷ 12
21. 24 × 3
22. 9 + 3
23. 26 ÷ 2
24. 5 + 7 + 8
25. 15 - 8
26. 8 × 2 × 1
27. 15 ÷ 5
28. 6 × 3

Math Skills Review II

1. 43 × 31
2. 198 ÷ 3
3. 25% of ___ is 12
4. 245 + 63
5. 175 − 63
6. 0.8 × 1.2
7. 15 − 6
8. 110 ÷ 11
9. 2.6 − 0.78
10. 19 + 7
11. 1/2 + 2/3
12. 24 × 8 × 1
13. 5/8 ÷ 5
14. 24 + 6.3
15. 24 ÷ 6
16. 18.4 − 7.63
17. 15 ÷ 0.3
18. 15 × 6
19. 100% of 23 is ___
20. ___% of 12 is 9
21. 123 + 210
22. 60% of 50 is ___
23. 4/9 × 1/2
24. 82 − 80
25. 5/6 − 3/4
26. 14 × 1.2
27. 1.8 + 2.45
28. 2.5 ÷ 0.5

Mathematics Curriculum

(Story specific word problems and "think tank" problems)

1. A plant manufactures baseball bats - 15 per hour. How many bats can be made each 10 hour work shift? (I)

2. A vehicle takes 7 minutes to go 14 miles. How fast is the vehicle traveling? (II)

3. The Facts: In military time, midnight (12 am) is 0000 hours and noon (12 pm) is 1200 hours.

   a. Describe 7:34 am in military time. (I)
   b. Describe 5:00 pm in military time. (I)
   c. How much time has elapsed from 0145 hours to 0915 hours? (II)
   d. Describe 1430 hours in standard time. (I)
   e. Describe 0215 hours in standard time. (I)

4. A baseball travels at a rate of 15 ft/sec. for 1 minute. How far does the baseball go? (II)

5. The Facts: Due to downsizing, XYZ Manufacturing settles on the following severance pay packages according to length of employment:

Years with the company	Severance A	Severance B
0-8	2 weeks pay	1 week pay + 2 months insurance premiums
9-20	3 weeks pay	2 weeks pay + 4 months insurance premiums
21 +	4 weeks pay	3 weeks pay + 6 months insurance premiums

   a. Severance A for 21+ years experience is ___________. (I)
   b. Phil has worked for XYZ for 4 years and chooses to receive 1 weeks pay + 2 months insurance premium, which package did he choose? (I)
   c. If a person is eligible for a severance of exactly 3 weeks pay, how many years has he/she worked for XYZ? (I)
   d. If a monthly insurance premium is worth $500.00, severance package B for 0-8 years experience is 1 weeks pay and $________. (I)
   e. Jane has worked for XYZ for 12 years and chooses severance B. What does her package consist of? (I)

6. To make a baseball bat, 3 feet of wood is required. How much is needed to make 10 baseball bats? (I)

7. Sales last month totalled $150,000. If they increase by 42% this month what are the new sales figures for the month? (II)

8. It takes 96 seconds to run all of the bases on the baseball diamond. How long, on the average, does it take to run to each base from the previous one? (II)

9. Determine the next item in the sequence:

10. Determine the next item in the sequence:

11. Determine the next two numbers in the sequence:

51, 42, 33, 24, ____ , ____ , ...

12. Complete the big picture:

a.

b.

c.

d.

13. Choose the unfolded sheet on the right that corresponds with the folded sheet on the left:

a.

b.

c.

d.

Posttest of Math Skills

1. 2146 + 1987   a. 1841   b. 159   c. 4133   d. 4162

2. 3 × 4   a. 7   b. 9   c. 12   d. 16

3. 912 ÷ 8   a. 101   b. 114   c. 904   d. 756

4. 245 - 34   a. 111   b. 279   c. 95   d. 211

5. 2 × 1 × 17   a. 34   b. 2   c. 17   d. 20

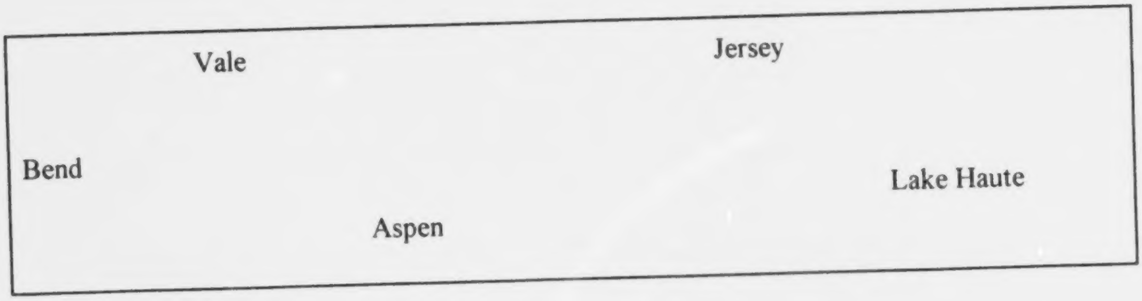
6. 8 + 5 + 2   a. 15   b. 13   c. 7   d. 10

7. 10% of 140   a. 1400   b. 14   c. 1.4   d. 126

8. 4/11 + 3/11   a. 12/11   b. 7/22   c. 7/11   d. 1/11

9. 8 - 5   a. 13   b. 3   c. 40   d. 5

10. 1 1/4 + 3 3/4   a. 4   b. 2 1/2   c. 4 4/8   d. 5



11. Determine the distance from Bend to Jersey by way of Vale.
    a. 37   b. 16   c. 21   d. 48

12. Determine the distance from Aspen to Lake Haute.
    a. 39   b. 59   c. 20   d. 48

13. How far is it from Vale to Bend and back again (round trip)?
    a. 32   b. 16   c. 42   d. 56

Contents of Phil's marble bag:

8 red
6 blue
4 green
5 black
1 yellow

14. How many marbles does Phil have in all?
a. 31 b. 18 c. 25 d. 24

15. How many more red marbles than black and yellow put together?
a. 4 b. 7 c. 3 d. 2

16. To find the area of a circle, use the formula $A = \Pi r^2$. Determine the area of a circle with a radius of 15 inches.
a. 196Π sq in b. 30Π sq in c. 225Π sq in d. $15\Pi^2$ sq in

17. Paul works 40 hours a week at a rate of $13 per hour. What is his weekly pay?
a. $274 b. $53 c. $520 d. $481

18. How much pocket change do you have if you are carrying 1 quarter, 4 dimes, 8 nickels, and 2 pennies?
a. $1.17 b. $1.07 c. 82 ¢ d. 99¢

19. What time is it 7 hours and 34 minutes after 10:15 am?
a. 5:49 pm b. 6:15 am c. 5:49 am d. 2:49 pm

20. How many gallon jugs can be filled with 32 quarts of liquid? (1 gal. = 4 qts.)
a. 32 gal. b. 7 gal. c. 128 gal. d. 8 gal.

Pretest Answer Key

1. C
2. B
3. D
4. B
5. A
6. A
7. B
8. B
9. D
10. A
11. C 1/2 × 2 = 1 c.
12. A 1/2 × 1/2 = 1/4 c.
13. B 1 1/2 + 1 1/2 + 2 + 3 = 8,
    so 4 × 2 = 8
14. B 1 1/2 × 2 = 3
15. C 3 × 2 = 6 = 2 × 3
16. A
17. A 45 ÷ 9 = 5
18. B $5.35 ÷ 24 = $0.22 or
    22¢
19. C 4 × 10 = 40
20. D 5280 ÷ 3 = 1760

Posttest Answer Key

1. C
2. C
3. B
4. D
5. A
6. A
7. B 0.10(140) = 14
8. C
9. B
10. D 4 4/4 = 5
11. A 16 + 21 = 37
12. B 20 + 39 = 59
13. A 16(2) = 32
14. D 8+6+4+5+1 = 24
15. D 8 − (5+1) = 8−6 = 2
16. C Area = $\Pi(15)^2 = 225\Pi$
17. C 40(13) = $520
18. B 25¢+4(10¢)+8(5¢)+2(1¢)
    = 25+40+40+2 = $1.07
19. A
20. D 32 ÷ 4 = 8

Review I Answer Key

1. 42
2. 107
3. 18
4. 111
5. 10
6. 165
7. 4
8. 8
9. 41
10. 35
11. 1
12. 110
13. 15
14. 88
15. 9
16. 2
17. 0
18. 27
19. 13
20. 6
21. 72
22. 12
23. 13
24. 20
25. 7
26. 16
27. 3
28. 18

Review II Answer Key

1. 1333
2. 66
3. 0.25x = 12, so x = 48
4. 308
5. 112
6. 0.96
7. 9
8. 10
9. 1.82
10. 26
11. 3/6 + 4/6 = 7/6 or 1 1/6
12. 192
13. 5/8 × 1/5 = 5/40 or 1/8
14. 30.3
15. 4
16. 10.77
17. 50
18. 90
19. 23
20. 12x = 9, so x = 0.75 or 75%
21. 333
22. 0.60(50) = 30
23. 4/18 or 2/9
24. 2
25. 10/12 - 9/12 = 1/12
26. 16.8
27. 4.25
28. 5

Mathematics Curriculum Answer Key

1. 15 × 10 = 150 baseball bats

2. 2 miles per minute, or 120 miles per hour!

3.
   a. 0734 hours
   b. 1700 hours
   c. 1:45 am until 9:15 am = 7 1/2 hours
   d. 2:30 pm
   e. 2:15 am

4. 15(60) = 900 feet

5.
   a. 4 weeks pay
   b. Severance B
   c. between 9 and 20 years
   d. $500(2) = $1000.00
   e. 2 weeks pay + 4 months insurance premiums

6. 10(3) = 30 feet

7. 150,000 + (0.42)(150,000) = 150,000 + 63,000 = $213,000

8. 96 ÷ 4 = 24 seconds

9. one more side each time

10. add one diagonal each time

11. 15, 6 Rule: subtract nine

12. A

13. B

Pretest of Math Skills

1. 6/7 - 2/7 a. 8/0 b. 4/14 c. 4/7 d. 8/7

2. 1243 + 5699 a. 6912 b. 6832 c. 4456 d. 6942

3. 48 - 12 a. 4 b. 60 c. 36 d. 47

4. 1/2 + 3 a. 5 2/3 b. 3/2 c. 3 1/2 d. 2/3

5. 28 + 3 + 15 a. 31 b. 46 c. 43 d. 18

6. 14 + 8 × 2 a. 36 b. 40 c. 44 d. 30

7. 215 - 178 a. 37 b. 163 c. 232 d. 128

8. 35 × 17 a. 595 b. 52 c. 245 d. 485

9. 6 × 3 × 2 a. 11 b. 30 c. 18 d. 36

10. 7245 ÷ 9 a. 805 b. 85 c. 96 d. 906

Joe's pocket change consists of 2 half-dollars, 3 quarters, 8 dimes, 2 nickels, and 7 pennies.

11. How much money does Joe have in all?
a. $2.22 b. $3.48 c. $3.67 d. $2.72

12. How much money does Joe have in dimes?
a. 75¢ b. 80¢ c. $1.00 d. 17¢

Area of a triangle is determined by the formula: A = ½bh
The Perimeter of a triangle is determined by adding up all of the side lengths.

13. Determine the area of the given triangle.
a. 4 sq units b. 8 sq units c. 23 sq units d. 19 sq units

14. Determine the perimeter of the given triangle.

a. 19 units b. 23 units c. 8 units d. 4 units

Checkbook register:

Check No.	Date	Payee	Withdraw	Deposit	Balance
					124.50
106	Feb. 4	Sam's	56.10		(#15)
107	March 10	WalMart	38.53		(#16)
	April 6	Paycheck		276.00	(#17)

Determine the balance(s) in the checkbook above:

15. a. $180.60 b. $68.40 c. $85.97 d. $68.00

16. a. $142.07 b. $29.87 c. $29.00 d. $47.44

17. a. $296.00 b. $418.07 c. $305.87 d. $323.44

18. Rahib took three spelling tests and scored 84, 92, and 100. What was his average score?

a. 96 b. 88 c. 84 d. 92

19. Phil worked 6 days this week. If he worked 7 hours each day, how many hours did he work in all this week?

a. 6 hrs. b. 42 hrs. c. 13 hrs. d. 21 hrs.

20. A house has 13 windows, 6 doors, and 4 bedrooms. How many more windows than bedrooms are there?

a. 9 b. 11 c. 7 d. 2

Math Skills Review I

1. 26 - 4 - 3
2. 2 × 4
3. 5 × 0 × 7
4. 69 - 58
5. 12 × 12
6. 7 + 8
7. 48 ÷ 4
8. 13 × 7
9. 265 + 9
10. 10 ÷ 2
11. 100 - 75
12. 24 + 11
13. 16 ÷ 16
14. 5 × 10
15. 72 ÷ 9
16. 25 ÷ 5
17. 12 + 13
18. 10 - 0
19. 2 + 6 + 3
20. 8 × 6 × 2
21. 45 × 20
22. 8 ÷ 4
23. 8 - 2 - 4
24. 4 - 3
25. 14 - 13
26. 364 + 14
27. 4 ÷2
28. 6 + 0 + 7

Math Skills Review II

1. 21 ÷ 3
2. 18 - 17 - 1
3. 5.6 - 0.78
4. 7 × 2 × 2
5. 16 + 7
6. 24 × 8
7. 2/3 + 2/3
8. 147 ÷ 7
9. 2.65 + 0.7
10. 0.28 - 0.07
11. 64 + 5
12. 2/5 × 3/4
13. 135 - 25
14. 7/8 - 1/2
15. 2.6 ÷ 2
16. 47 - 35
17. 24.6 × 8.3
18. 28 + 10 + 11
19. 2% of 86 is ___
20. 1.64 + 24.7
21. 357 × 4
22. ___% of 48 is 24
23. 75 ÷ 5
24. 15 × 1.8
25. 10% of ___ is 8
26. 12.5 ÷ 0.5
27. 1/7 ÷ 1/8
28. 15% of 70 is ___

Mathematics Curriculum
(Story specific word problems and "think-tank" problems)

1. A manufacturing company produces nuts and bolts. If they are packaged 1250 to a box, how many boxes are necessary for 4375 nuts and bolts? (II)

2. The Facts: Required safety equipment and costs:

hard hats	$11.75 each
safety goggles	$8.50 a pair
steel-toed boots	$48.95 a pair

a. What is the cost of outfitting **one** safety manager? (I)
b. How much money is necessary in the safety equipment budget for all 7 safety managers? (II)
c. A plant needs to keep on hand at all times 23 hard hats. Determine the total cost of these. (II)
d. How much more is a hard hat than a pair of safety goggles? (I)
e. How much change would you expect to receive from a $100 bill after purchasing 2 pair of steel-toed boots? (II)

3. In a 365-day year, 20% of the year is lost to injuries. How many days are lost? (II)

4. Ten phone messages are taken each day by the receptionist. How many messages are taken in 4 days? (I)

5. There are 261 working days in a year. If 8 of these are paid holidays, how many days are left? (I)

6. A safety manager is required to attend 15 hours of training classes and 3 hours of CPR instruction. How many hours total are spent in training? (I)

7. The plant manager makes $12.75 per hour. What is his gross paycheck amount for 34 hours? (II)

8. The Facts:

	Shift 1	Shift 2	Shift 3
# employees	15	10	36
# managers	3	2	4

a. On shift 1, how many employees are there for each manager to supervise? (I)
b. On shift 2, how many employees are there for each manager to supervise? (I)
c. On shift 3, how many employees are there for each manager to supervise? (I)
d. 50% of shift 3 employees go home sick. How many is this? (II)

e. 2/3 of shift 1 employees are female. How many is this? (II)

9. Determine the next item in the sequence:

10. Determine the next item in the sequence:

11. Determine the next two numbers in the sequence:

2, 8, 16, 22, 44, ___, ___, ...

12. Complete the big picture:

a.

b.

c.

d.

13. Choose the unfolded sheet on the right that corresponds with the folded sheet on the left:

a.

b.

c.

d.

Posttest of Math Skills

1. 15 + 24 a. 11 b. 9 c. 39 d. 48

2. 16 ÷ 8 a. 2 b. 8 c. 3 d. 6

3. 475 + 139 a. 614 b. 344 c. 604 d. 586

4. 124 ÷ 4 a. 496 b. 31 c. 30 d. 120

5. 4 + 7 + 4 a. 23 b. 8 c. 11 d. 15

6. 7 × 8 + 3 a. 77 b. 45 c. 18 d. 59

7. 5/10 - 2/10 a. 7/10 b. 3/10 c. 3/0 d. 2/10

8. 41 × 10 a. 141 b. 41 c. 410 d. 0

9. 3045 - 1763 a. 1282 b. 2722 c. 4808 d. 1813

10. 3252 ÷ 6 a. 542 b. 496 c. 3246 d. 204

Wagons on SALE!!
Originally $54.80 Now 15% off!

11. Find the amount of the discount on the wagons.
a. $46.58 b. $8.22 c. $5.48 d. $10.96

12. Find the new (sale) price of one wagon.
a. $43.84 b. $63.02 c. $8.22 d. $46.58

JADE'S FLORIST
Roses: Single $1.25
1/2 Dozen $7.00
Dozen $13.75

13. What is the cost of a single rose if purchased at the 1/2 dozen price?
a. $1.15 b. $1.25 c. $1.00 d. $1.17

14. How much is saved when buying 2 dozen roses at the dozen price rather than at the single price? a. $1.25 b. $2.50 c. $27.50 d. 50¢

15. Determine the cost of a single rose at each of the advertised prices.
a. $1.25, $1.00, $1.06 b. $1.25, $1.20, $1.12

c. $1.25, $1.17, $1.15 d. $1.25, $1.15, $1.13

16. A police force has 38 traffic patrol officers. If they travel in pairs, how many pairs are there?
a. 18 b. 38 c. 13 d. 19

17. Betty scored 95, 98, and 74 on her first 3 tests. If her average for **four** tests was 88, what is a possible score for the 4th test?
a. 85 b. 56 c. 96 d. 89

18. Determine the perimeter of rectangle ABCD.
a. 28 sq in b. 11 sq in c. 11 in. d. 22 in.

19. A carton can hold 15 baby rattles. How many cartons will it take to pack 140 baby rattles?
a. 15 b. 125 c. 10 d. 9

20. If a vehicle gets 17 miles to the gallon, how many miles can be traveled on 15 gallons?
a. 32 b. 255 c. 289 d. 118

Pretest Answer Key

1. C

2. D

3. C

4. C

5. B

6. D

7. A

8. A

9. D

10. A

11. D 2(.50) + 3(.25) + 8(.10) + 2(.05) + 7(.01) = 1.00 + 0.75 + 0.80 + 0.10 + 0.07 = \$2.72

12. B

13. B A = (1/2)(4)(4) = (1/2)(16) = 8

14. A 10 + 4 + 5 = 19

15. B

16. B

17. C

18. D 84 + 92 + 100 = 276 and 276 ÷ 3 = 92

19. B 6 × 7 = 42

20. A 13 – 4 = 9

Posttest Answer Key

1. C

2. A

3. A

4. B

5. D

6. D

7. B

8. C

9. A

10. A

11. B 0.15(54.80) = \$8.22

12. D 54.80 – 8.22 = \$46.58

13. D 7.00 ÷ 6 = \$1.17

14. B 13.75(2) = 27.50 and 1.25(24) = 30.00, so 30.00 – 27.50 = \$2.50

15. C

16. D 38 ÷ 2 = 19

17. A (95 + 98 + 74 + x)÷4 = 88 so 267+x = 350; x= 85

18. D 4 + 7 + 4 + 7 = 22 inches

19. C 140 ÷ 15 = 9.3, so 10

cartons are necessary

20. B 17 × 15 = 255

Review I Answer Key

1. 19
2. 8
3. 0
4. 11
5. 144
6. 15
7. 12
8. 91
9. 274
10. 5
11. 25
12. 35
13. 1
14. 50
15. 8
16. 5
17. 25
18. 10
19. 11
20. 96
21. 900
22. 2
23. 2
24. 1
25. 1
26. 378
27. 2
28. 13

Review II Answer Key

1. 7
2. 0
3. 4.82
4. 28
5. 23
6. 192
7. 4/3 or 1 1/3
8. 21
9. 3.35
10. 0.21
11. 69
12. 6/20 or 3/10
13. 110
14. 7/8 - 4/8 = 3/8
15. 1.3
16. 12
17. 204.18
18. 49
19. 0.02(86) = 1.72
20. 26.34
21. 1428
22. 48x = 24, so x = 0.5 or 50%
23. 15
24. 27
25. 0.10x = 8, so x = 80
26. 25
27. 1/7 × 8/1 = 8/7 or 1 1/7
28. 0.15(70) = 10.5

Mathematics Curriculum Answer Key

1. 4375 ÷ 1250 = 3.5, so you would need 4 boxes
2.
   a. 11.75 + 8.50 + 48.95 = \$69.20
   b. 7(69.20) = \$484.40
   c. 23(11.75) = \$270.25
   d. 11.75 - 8.50 = \$3.25
   e. 100 - 48.95(2) = 100 - 97.90 = \$2.10
3. (0.20)(365) = 73 days
4. 10(4) = 40 messages
5. 261 - 8 = 253 days
6. 15 + 3 = 18 hours
7. \$12.75(34) = \$433.50
8.
   a. 15 ÷ 3 = 5 employees
   b. 10 ÷ 2 = 5 employees
   c. 36 ÷ 4 = 9 employees
   d. 0.50(36) = 18 employees
   e. (2/3)(15) = 10 females
9. each one has double the number of sections in it as the previous one
10. one less side each time
11. 50, 100 Rule: add six, then multiply by two
12. B
13. A

Pretest of Math Skills

1. 257 + 38 a. 316 b. 295 c. 219 d. 307

2. 16 + 7 a. 9 b. 34 c. 23 d. 112

3. 6 × 5 a. 25 b. 30 c. 35 d. 40

4. 78 ÷ 3 a. 234 b. 81 c. 13 d. 26

5. 116 − 35 a. 81 b. 151 c. 121 d. 96

6. 4/7 + 2/7 a. 2/7 b. 6/14 c. 6/7 d. 8/49

7. 15 × 18 a. 33 b. 90 c. 270 d. 120

8. 12 + 14 + 6 a. 20 b. 26 c. 18 d. 32

9. 4 × 0 × 5 a. 4 b. 20 c. 0 d. 5

10. 8 − 6 a. 14 b. 2 c. 0 d. 5

VISIT OUR NEW SPA
ANYTIME DURING THE MONTH OF
MAY FOR THE LOW PRICE OF $49.00 PER DAY!!

All other months are $55.00 per day

11. What is the cost of one *week* in May? a. $49 b. $294 c. $343 d. $98

12. What is the cost of one *week* in Oct.? a. $110 b. $343 c. $330 d. $385

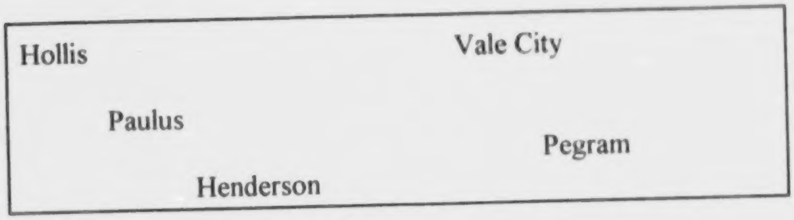
13. What is the cost of one *day* in Jan.? a. $49 b. $55 c. $6 d. $104

	REGULAR Price	SALE Price
dress shoes	$36.00	$27.00
skirt	$27.00	$22.50
blouse	$30.60	$15.30

14. How much do you save by buying the skirt on sale?
a. $3 b. $4.50 c. $5.50 d. $6

15. You want to buy 2 blouses. How much do you save by buying them on sale?
a. $18.90 b. $40 c. $15.30 d. $30.60

16. What is the percent of discount on the dress shoes?
a. 25% b. 10% c. 50% d. 9%



17. How far is it from Paulus to Pegram?
a. 18 b. 27 c. 34 d. 44

18. How far is it from Henderson to Hollis and back (round trip)?
a. 70 b. 35 c. 54 d. 68

19. Jane went bowling and bowled four games. Her scores were 78, 54, 100, and 98. What was her average score?
a. 89 b. 110 c. 82.5 d. 330

20.

Determine the perimeter of the triangle above.
a. 25 b. 43 c. 32 d. 38

Math Skills Review I

1. 3 + 5
2. 14 - 11
3. 15 + 3
4. 1 × 8 × 2
5. 45 - 44
6. 5 ÷ 1
7. 12 ÷ 3
8. 24 + 8
9. 5 + 4 + 3
10. 4 × 2
11. 12 - 3
12. 3 × 0
13. 246 - 103
14. 16 × 5
15. 10 + 12
16. 64 ÷ 4
17. 3 × 3 × 3
18. 38 ÷ 19
19. 20 × 18
20. 110 + 0
21. 16 - 16
22. 106 + 35
23. 8 × 7
24. 41- 21
25. 48 ÷ 8
26. 38 - 19
27. 64 ÷ 2
28. 120 ÷ 10

Math Skills Review II

1. $123 + 38$
2. 46×0.3
3. $18.5 - 3.45$
4. $10 + 10 + 8$
5. $16 \div 4$
6. 16×15
7. $3/4 \div 1/2$
8. $3696 \div 12$
9. $145 - 39$
10. $1/2 + 2/5$
11. 10% of 18 is ___
12. $2 \times 5 \times 2$
13. $48 + 0.7$
14. ___% of 100 is 50
15. $6.5 + 7.4$
16. $68 \div 0.2$
17. 2.45×7.2
18. 8×21
19. 6% of 40 is ___
20. $210 - 15$
21. $49 - 10$
22. $24 \div 2$
23. $7/8 - 4/8$
24. $4.5381 \div 3$
25. $1.43 - 0.7$
26. $295 + 38 + 4$
27. 25% of ___ is 10
28. $2/5 \times 7$

Mathematics Curriculum

(Story specific word problems and "think tank problems)

1. There are 12 diet clerks working at any given time in the hospital. If they must input 1344 menus in all into the computer during a shift, how many will each clerk input? (II)

2. A hospital kitchen is responsible for preparing 3 meals a day for each of its 134 patients. How many meals is this in all each day? (I)

3. The Facts: Suppose each patient stays in the hospital three days on the average. There are 123 private patient rooms in the hospital. The cost of a one day stay in $356 per patient per room.

   a. How many patients can stay in this hospital when it is at capacity (all rooms full)? (I)
   b. What is the average cost per person for a hospital stay? (II)
   c. If the hospital has 3 floors of patient rooms, how many rooms are there per floor? (I)
   d. Suppose the insurance company pays 80% of the cost of an average stay. What part does the patient pay? (II)
   e. Each room contains 2 visitor chairs. How many chairs would this be in all? (I)

4. Mercy Memorial employs 15 diet clerks, 4 nutritionists, and 38 cooks. How many more cooks than diet clerks are there? (I)

5. A meal request is received in the kitchen at 7:38 am. The meal is delivered at 11:48 am. How much time has elapsed? (I)

6. An employee's paycheck gross amount is $254.61. If the employee worked three 8-hour days, how much was made per day? (II)

7. The Facts: General Hospital employs 275 people. Two-fifths of them are male.

   a. How many employees are male? (II)
   b. What fraction of the employees are female? (I)
   c. How many employees are female? (II)
   d. If 20% are clerical employees, how many would this be? (II)
   e. Mercy Hospital employs 112 more people than General. How many is this? (I)

8. A prescription for glasses costs $28.95 for the lenses and $82.00 for the frames. What is the total cost for the new glasses? (I)

9. Determine the next item in the sequence:

10. Determine the next item in the sequence:

11. Determine the next two numbers in the sequence:

1, 4, 2, 5, 3, ______, ________, ...

12. Complete the big picture:

a.

b.

c.

d.

13. Choose the unfolded sheet on the right that corresponds with the folded sheet on the left:

a.

b.

c.

d.

Posttest of Math Skills

1. 16 × 37   a. 592   b. 53   c. 560   d. 218

2. 48 + 72   a. 116   b. 110   c. 120   d. 129

3. 2 + 8 + 6   a. 50   b. 22   c. 16   d. 18

4. 5% of 180   a. 18   b. 9   c. 90   d. 27

5. 1 2/3 − 1/2   a. 5/6   b. 1 1/3 or 4/3   c. 1   d. 1 1/6 or 7/6

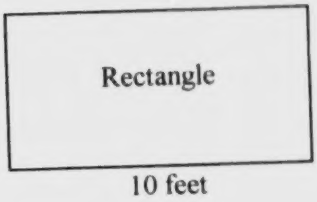
6. 127 − 39   a. 112   b. 88   c. 86   d. 98

7. 6/11 + 3/11   a. 9/11   b. 12/22   c. 18/22   d. 3/11

8. 126 ÷ 6   a. 20   b. 120   c. 21   d. 211

9. 4 × 5   a. 30   b. 15   c. 25   d. 20

10. 385 + 176   a. 451   b. 209   c. 561   d. 583



11. What is the perimeter of this rectangle?
a. 18 feet   b. 28 feet   c. 36 feet   d. 80 feet

12. What is the area of this rectangle?
a. 18 sq. ft.   b. 28 sq. ft.   c. 36 sq. ft.   d. 80 sq. ft.

Prescription for John Doe:

Dose: Take 3 pills daily. One at each meal.

Each pill = 250 mg Contents: 30 pills

13. How many mg of medicine is prescribed for each day?
a. 3 mg b. 750 mg c. 500 mg d. 75 mg

14. How many mg are there in the entire bottle?
a. 7500 mg b. 750 mg c. 500 mg d. 900 mg

15. If taken as prescribed, how many days will this medicine last?
a. 15 days b. 30 days c. 90 days d. 10 days

16. John's vehicle fuel tank holds 16 gallons. If he gets 20 miles per gallon, how many miles can he go on a full tank?
a. 400 miles b. 320 miles c. 360 miles d. 420 miles

17. Myra's bank account has a balance of $173.29. If she writes a check for $49.50, what is her new balance? a. $222.79 b. $124 c. $80.23 d. $123.79

18. Jill works 25 hours each week. If she is paid $8 per hour, what is her pay for one week?
a. $33 b. $200 c. $100 d. $150

Contents of Sally's bag of marbles:

3 Red 4 Black 2 Blue 7 Green 1 Yellow

19. How many marbles does Sally have in all?
a. 17 b. 9 c. 16 d. 13

20. How many more green marbles than blue and yellow together?
a. 5 b. 4 c. 3 d. 0

Pretest Answer Key

1. B
2. C
3. B
4. D
5. A
6. C
7. C
8. D
9. C
10. B
11. C $49 × 7 = $343
12. D $55 × 7 = $385
13. B
14. B $27 – $22.50 = $4.50
15. D $30.60 × 2 = 61.20 and $15.30 × 2 = 30.60, so 61.20 – 30.60 = $30.60
16. A $9 off, so 9/36 = 1/4 or 25%
17. C 18 + 16 = 34
18. A 9 + 26 + 26 + 9 = 70
19. C 78 + 54 + 100 + 98 = 330 and 330÷4 = 82.5
20. D 6 + 18 + 14 = 38

Posttest Answer Key

1. A
2. C
3. C
4. B 0.05(180) = 9
5. D 1 4/6 – 3/6 = 1 1/6
6. B
7. A
8. C
9. D
10. C
11. C 8 + 10 + 8 + 10 = 36 feet
12. D 8(10) = 80 sq. ft.
13. B 250(3) = 750 mg
14. A 250(30) = 7500 mg
15. D 30 ÷ 3 = 10 days
16. B 16 × 20 = 320
17. D $173.29 – 49.50 = $123.79
18. B 25 × 8 = 200
19. A 3 + 4 + 2 + 7 + 1 = 17
20. B 7 – (2 + 1) = 7 – 3 = 4

Review I Answer Key

1. 8
2. 3
3. 18
4. 16
5. 1
6. 5
7. 4
8. 32
9. 12
10. 8
11. 9
12. 0
13. 143
14. 80
15. 22
16. 16
17. 27
18. 2
19. 360
20. 110
21. 0
22. 141
23. 56
24. 20
25. 6
26. 19
27. 32
28. 12

Review II Answer Key

1. 161
2. 13.8
3. 15.05
4. 28
5. 4
6. 240
7. 3/4 × 2/1 = 6/4 = 1 2/4 = 1 1/2
8. 308
9. 106
10. 5/10 + 4/10 = 9/10
11. 0.10(18) = 1.8
12. 20
13. 48.7
14. 100x = 50, so x = 1/2 or 50%
15. 13.9
16. 340
17. 17.64
18. 168
19. 0.06(40) = 2.4
20. 195
21. 39
22. 12
23. 3/8
24. 1.5127
25. 0.73
26. 337
27. 0.25x = 10, so x = 40
28. 14/5 or 2 4/5

Mathematics Curriculum Answer Key

1. 1344 ÷ 12 = 112 menus each

2. 134 × 3 = 402 meals

3.
   a. 123
   b. 356 × 3 = $1068
   c. 123 ÷ 3 = 41 rooms per floor
   d. 20% or 0.20(1068) = $213.60
   e. 123 × 2 = 246 chairs

4. 38 - 15 = 23 more

5. 4 hours 10 minutes

6. $254.61 ÷ 3 = $84.87 per day

7.
   a. 2/5 × 275 = 110 males
   b. 3/5
   c. 3/5 × 275 = 165 females
   d. 0.20(275) = 55 clerical
   e. 275 + 112 = 387 people

8. $28.95 + 82.00 = $110.95

9. add one additional line segment, thus adding one section

10. alternate shading the top and bottom sections

11. 6, 4 Rule: add three then subtract two
12. C

13. C

Pretest of Math Skills

1. 410 + 343 a. 153 b. 695 c. 753 d. 744
2. 18 × 7 a. 126 b. 11 c. 306 d. 135
3. 20% of 100 a. 2 b. 20 c. 30 d. 25
4. 6 + 5 + 4 a. 10 b. 15 c. 14 d. 11
5. 4/7 + 1/7 a. 3/7 b. 5/14 c. 4/49 d. 5/7
6. 216 ÷ 6 a. 45 b. 210 c. 28 d. 36
7. 78 - 75 a. 70 b. 8 c. 3 d. 4
8. 10 ÷ 2 a. 6 b. 12 c. 20 d. 5
9. 239 - 143 a. 96 b. 113 c. 196 d. 16
10. 6 × 1 × 0 a. 61 b. 0 c. 1 d. 6

Weight of Shapes:

■ = 5 pounds ▲ = 3 pounds ● = 7 pounds

■■▲ = ●▲ __?__

11. What is the weight of the left side?
a. 8 lbs b. 13 lbs c. 10 lbs d.12lbs

12. How much is needed on the right side to balance the scale?
a. none b. 1 lb c. 2 lbs d. 3 lbs

Plane type	**# of passenger seats**
737	120
DC9	95
Stretch 80	90

13. How many more passengers can be carried on a 737 than on the Stretch 80?
a. 25　b. 5　c. 30　d. 15

14. Which plane can carry the fewest passengers?
a. Stretch 80　b. DC9　c. 737　d. 747

15. If there are 5 seats per row in the DC9, how many rows of passenger seats are there?
a. 20　b. 24　c. 18　d. 19

16. A pair of jeans regularly costs $23. If the price is increased by $4, what is the new cost of the jeans? a. $19　b. $31　c. $27　d. $29

17. A baby drinks 6 bottles each day. If each bottle contains 7 ounces of fluid, how much is consumed each day?　a. 49 oz.　b. 56 oz.　c. 36 oz.　d. 42 oz.

18. How much money do you have if your pocket change contains 3 quarters, 1 dime, and 7 pennies?　a. 92¢　b. 75¢　c. 85¢　d. 98¢

JOIN OUR ATHLETIC CLUB FOR ONLY **$30 PER MONTH**
1/2 price during December only!!

19. What is the cost to join the club in December?
a. $30　b. $60　c. $15　d. $45

20. How much would it cost to join for 2 months, beginning in February?
a. $30　b. $60　c. $15　d. $45

Math Skills Review I

1. $6 + 7$
2. 5×30
3. $18 \div 3$
4. $26 + 4$
5. $16 - 4 - 3$
6. $38 - 12$
7. $2 \times 6 \times 8$
8. $10 - 8$
9. $14 \div 2$
10. $6 \div 3$
11. $107 + 83$
12. $39 \div 3$
13. $12 + 46$
14. $423 - 102$
15. $14 - 3$
16. 12×12
17. 12×9
18. 10×8
19. 14×0
20. $210 + 17 + 4$
21. $6 \times 2 \times 3$
22. $3 + 8 + 9$
23. $56 \div 7$
24. $68 - 7$
25. $5 - 2$
26. $20 \div 5$
27. $5 + 0 + 2$
28. $124 \div 2$

Math Skills Review II

1. 196 ÷ 14
2. 11 × 8
3. 245 + 76
4. 58 ÷ 2

5. 66 + 29
6. 2/5 − 1/3
7. 2.7 + 83.1
8. 12 × 0.7

9. 8.5 − 2.4
10. 16 − 2.4
11. 2.5 × 0.78
12. 27 − 9

13. 26 × 35
14. __% of 25 is 10
15. 14 × 7
16. 1 1/7 + 2/3

17. 2.45 ÷ 5
18. 163 + 18 + 7
19. 5% of 80 is __
20. 1.32 ÷ 1.2

21. 48 − 47
22. 4/7 × 1/8
23. 6 ÷ 1/3
24. 8.45 + 23.5

25. 50% of ___ is 42
26. 125 ÷ 5
27. 123 − 63
28. 20% of 85 is ___

Mathematics Curriculum

(Story specific problems and "think tank" problems)

1. The Facts: Lazy Days Motel employs 35 housekeepers and has 315 guest rooms. Each guest room rents for $54 per night.

   a. How many rooms must each housekeeper clean if the motel was fully occupied? (II)
   b. If 60% of the rooms are full, how many are vacant? (II)
   c. What is the maximum income possible in one night at full capacity? (II)
   d. If there are 2 guests per room and the motel is full, how many guests are there in all?(I)

   e. It takes a housekeeper 20 minutes to clean a room. How long will it take him to clean 5 rooms? (I)

2. A hotel has 4 floors with 14 guest rooms per floor. How many guest rooms are there in all?(I)

3. A group of new American citizens are taking English classes. If each class period is 55 min. long and the entire course takes 15 class periods, how many minutes are spent in class? (II)

4. An elevator begins at floor 1 and 3 people enter. On floor 2, 4 more enter and 2 exit. The elevator passes floor 3 and on floor 4, 6 people enter and 8 exit. How many people remain on the elevator? (I)

5. A hotel manager has 2 assistant managers that work for her. If each assistant manager is responsible for 46 employees, how many people (including all of the managers) are employed by the hotel? (II)

6. The Night Owl Motel has 138 guest rooms while the Partnership Inn has 214. How many more rooms are there in the Partnership Inn? (I)

7. A police convention is providing 64 different seminars for its attendees. If each officer is to attend at least 25% of what is offered, how many would this be? (II)

8. The Facts: Value Days Motel prides itself on its special touches. Each night, each guest receives a mint on his/her pillow. Each room is supplied with a toiletry kit including shampoo, conditioner, toothpaste, and soap. The motel has 98 guest rooms.

   a. How many mints are needed if each room is occupied by 2 guests? (I)
   b. If each mint costs 2¢, how much is spent on 136 mints? (I)
   c. How many toiletry kits are necessary if half of the rooms are occupied? (I)
   d. Each room receives 2 tubes of toothpaste in its toiletry kit. If the housekeepers have 78 tubes of toothpaste, how many rooms can be supplied? (II)
   e. A double bed has 2 pillows and a king size has 3 pillows. How many pillows are there in all if the hotel has 48 double bed rooms and 50 king size bed rooms? (II)

9. Determine the next item in the sequence:

10. Determine the next item in the sequence:

11. Determine the next two numbers in the sequence:

54, 18, 6, ____, ____, ...

12. Complete the big picture:

a.

b.

c.

d.

13. Choose the unfolded sheet on the right that corresponds with the folded sheet on the left:

a.

b.

c.

d.

Posttest of Math Skills

1. 4 × 6 a. 32 b. 10 c. 18 d. 24

2. 3 × 2 + 5 a. 17 b. 10 c. 21 d. 11

3. 4 + 5 + 3 a. 48 b. 12 c. 11 d. 60

4. 6/10 − 3/10 a. 9/10 b. 3/0 c. 3/10 d. 9/20

5. 100% of 83 a. 57 b. 83 c. 38 d. 100

6. 356 + 478 a. 834 b. 122 c. 724 d. 422

7. 645 ÷ 5 a. 129 b. 640 c. 43 d. 243

8. 200 − 34 a. 184 b. 166 c. 234 d. 134

9. 25 ÷ 5 a. 4 b. 20 c. 5 d. 7

10. 3345 + 6 a. 3405 b. 3351 c. 3945 d. 3339

Item	Original Price	New Price
jeans	$30	$28
lamp	$18	$27
cellular phone	$129.95	$86

11. Which item increased in price?
    a. lamp b. jeans c. blouse d. cellular phone

12. You have $350 to spend. How many cellular phones can you purchase at the new price?
    a. 5 b. 3 c. 2 d. 4

13. How much is saved when buying a pair of jeans at the new price?
    a. $2 b. $58 c. $9 d. $43

Magazine	Number of issues per year	Price per issue
Health & You	12	$1.85
Today's Teenager	52	45¢

14. What is the cost of one year of *Health & You*?
a. $5.40 b. $22.20 c. $96.20 d. $17.55

15. There is a 25% discount on the second year if you subscribe to two years of *Today's Teenager*. What is the cost of a two year subscription?
a. $23.40 b. $22.20 c. $17.55 d. $40.95

16. Joan's car had 67 L of gasoline when she left home. When she returned she had 38 L left. How many liters (L) had been used?
a. 31 b. 38 c. 29 d. 105

17. Bill uses 1/2 tsp. of cinnamon to make one dozen cookies. How many tsp. of cinnamon are necessary to make 5 dozen cookies?
a. 2 1/2 b. 7/5 c. 5 d. 3

18. How many hours is it from 8 am until 12 am?
a. 14 b. 16 c. 4 d. 8

Table of Liquid Measures

1 c. = 8 fl. oz. 1 pt. = 2 c. 1 qt. = 2 pt. 1 gal. = 4 qt.

19. How many fluid ounces (fl. oz.) are there in 3 cups (c.)?
a. 24 b. 6 c. 12 d. 30

20. One gallon is equivalent to how many pints?
a. 4 b. 32 c. 8 d. 6

Pretest Answer Key

1. C
2. A
3. B
4. B
5. D
6. D
7. C
8. D
9. A
10. B
11. B 5 +5 +3 = 13
12. D
13. C 120 − 90 = 30
14. A
15. D 95 ÷ 5 = 19
16. C 23 + 4 = 27
17. D 6 × 7 = 42
18. A 3(25) + 1(10) + 7(1) = 75
    + 10 + 7 = 92
19. C (1/2)(30) = $15
20. B 30(2) = $60

Posttest Answer Key

1. D
2. D
3. B
4. C
5. B
6. A
7. A
8. B
9. C
10. B
11. A
12. D 350 ÷ 86 = 4.07
13. A 30 − 28 = 2
14. B 12(1.85) = $22.20
15. D 52(.45) + (.75)(52)(.45) =
    23.4 + 17.55 = $40.95
16. C 67 − 38 = 29
17. A 1/2 × 5 = 2 1/2
18. B
19. A 3 × 8 = 24
20. C 4 × 2 = 8

Review I Answer Key

1. 13
2. 150
3. 6
4. 30
5. 9
6. 26
7. 96
8. 2
9. 7
10. 2
11. 190
12. 13
13. 58
14. 321
15. 11
16. 144
17. 108
18. 80
19. 0
20. 231
21. 36
22. 20
23. 8
24. 61
25. 3
26. 4
27. 7
28. 62

Review II Answer Key

1. 14
2. 88
3. 321
4. 29
5. 95
6. 6/15 - 5/15 = 1/15
7. 85.8
8. 8.4
9. 6.1
10. 13.6
11. 1.95
12. 18
13. 910
14. 25x=10, so x=0.4 or 40%
15. 98
16. 1 3/21 + 14/21 = 1 17/21
17. 0.49
18. 188
19. 0.05(80) =4
20. 1.1
21. 1
22. 4/56 or 1/14
23. 6 × 3/1 = 18
24. 31.95
25. 0.50x=42, so x=84
26. 25
27. 60
28. 0.20(85)=17

Mathematics Curriculum Answer Key

1.
   - a. $315 \div 35 = 9$
   - b. 40% or $0.40(315) = 126$
   - c. $315 \times 54 = \$17010.00$
   - d. $315 \times 2 = 630$
   - e. $20(5) = 100$ minutes

2. $4(14) = 56$ rooms

3. $55(15) = 825$ minutes or 13 hours and 45 minutes

4. $3 + 4 - 2 + 6 - 8 = 3$ people remain

5. $1 + 2 + 2(46) = 1 + 2 + 92 = 95$

6. $214 - 138 = 76$

7. $0.25(64) = 16$ seminars

8.
   - a. $98 \times 2 = 196$
   - b. $136 \times 2 = 272$¢ or \$2.72
   - c. $98 \div 2 = 49$
   - d. $78 \div 2 = 39$
   - e. $48(2) + 50(3) = 96 + 150 = 246$

9. one additional section shaded

10. clockwise rotation of the smaller figures with the larger one

11. 2, 2/3 Rule: divide by three

12. A

13. D

Pretest

1. 243 + 107

2. 6004 - 196

3. 24 × 10

4. 500 ÷ 5

5. 2/3 + 4/3

6. Nurse technicians make $5.40 per hour. What is the expected gross paycheck amount for a 38 hour week?

7. There are 10 shoe stores in the mall and each one employs 11 people. How many shoe store employees are there in all?

8. Fred empties 18 bedpans and Sue empties 27 bedpans. How many more did Sue empty than Fred?

9. Of the 36 nurses on staff, 25% are in management roles. How many nurses are NOT in management?

10. Sam attends 156 therapy sessions per year. How many is this per week? (1 yr. = 52 wks)

11. The Facts: Average jail term for various crimes:

obstruction of justice - 30 days
auto theft - 3 years
breaking & entering - 6 months
shoplifting - 90 days

a. Which crime has the longest jail term?
b. Which crime has the shortest jail term?
c. Suppose an individual commits all of the listed crimes. What would be his/her total jail time? (assume the times are served consecutively and not concurrently!)
d. How much longer is served for shoplifting than for obstruction of justice?
e. It costs taxpayers $8,564.00 per year to jail one inmate. How much would it cost for an auto theft criminal?

Math Skills Review I

1. $5 + 8$
2. $2 + 4 + 5$
3. $13 + 7$
4. $10 + 12$
5. $36 + 18$
6. $107 + 9$
7. $3 + 6$
8. $4 - 3$
9. $7 - 2$
10. $18 - 17$
11. $9 - 8$
12. $36 - 12$
13. $147 - 36$
14. $20 - 15$
15. 3×7
16. 7×9
17. 8×8
18. 4×10
19. 5×16
20. $8 \times 2 \times 3$
21. 11×7
22. $24 \div 6$
23. $48 \div 8$
24. $123 \div 3$
25. $50 \div 2$
26. $8 \div 2$
27. $10 \div 10$
28. $16 \div 4$

Math Skills Review II

1. 14 × 7
2. 2 1/3 + 3 2/3
3. 6/7 ÷ 12/14
4. 15% of 4
5. 1/2 + 1/5
6. 1.74 + 10.4
7. 8 × 0.7
8. 2/3 - 1/4
9. 49 ÷ 7
10. ___% of 64 is 19.2
11. 11 - 9
12. 138 + 46
13. 4/9 ÷ 1/18
14. 8% of 47
15. 57 - 18
16. 250 ÷ 10
17. 1/4 × 3/7
18. 3 4/5 - 1 1/6
19. 3 × 3 × 3
20. ___% of 85 is 34
21. 20.6 + 15
22. 30 ÷ 2.5
23. 153 - 0.76
24. 1.4 × 10.6
25. 121 ÷ 11
26. 8 - 6 - 2
27. 91 ÷ 35
28. square root of 25

Mathematics Curriculum

1. There are 78 police officers on patrol at any given time. If the city is 936 square miles in all, approximately how many square miles is each officer responsible for?

2. Elm Grove home houses 196 people and Oak Tree home houses 113. How many more people are there at Elm Grove than at Oak Tree?

3. Each of the 4 malls in town has 8 shoe stores. Determine the total number of shoe stores in the malls.

4. A nurse technician makes $5.24 per hour. If her gross paycheck is for $131.00, how many hours were worked at this rate?

5. The Facts: Residential facility medical inventory:

   bedpans - 157
   walkers - 95
   canes - 106
   wheelchairs - 32
   ace wraps - 67
   boxes of polident - 88

   a. If there are 96 patients who need ace wraps, how many more are needed?
   b. 25% of the polident in stock is used just before Friday "date night", so how much remains in stock?
   c. How many more canes than walkers are there?
   d. The home has 224 residents. How many of them must share each wheelchair?
   e. 21 of the bedpans in stock leak and 37 are dented. How many are in good working order?

6. Of the 39 nurse technicians on staff, 27 are RN certified, 10 are RN and LPN certified, and the rest are LPN certified only. How many are LPN certified only?

7. It takes 12 minutes to bathe each patient in the hospital. How many patients can be bathed in a nurses's 3 1/2 hour shift?

8. How long will it take a doctor to make her rounds if she spends 11 minutes, on the average, with each of the 13 patients?

9. The breakfast serving line opens at 7:00 am each morning. It takes each resident 3 minutes to get through the cafeteria line. If there are 29 residents eating breakfast, what time will the serving line be cleared of all of the breakfast eaters?

10. A call comes in to the police dispatcher's office at 11:38 am. If the squad car responds by 12:11 pm, how much time has elapsed?

11. If there are 111 visitors on Sunday and there are 37 patients, determine the number of visitors per patient, on the average.

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12. Put the following serial numbers in order from greatest to least: M560, M5060, M506, M650, M121, M12, M211, M112.

13. The Facts: Fines charged for various criminal acts:

speeding $51	mail fraud $98	loitering $16
grand larceny $210	embezzling $68	robbery $115

a. Suppose an individual commits each crime listed above once. Determine the total fine.
b. How much more is charged for robbery than for loitering?
c. Which crime yields the greatest fine? the least fine?
d. Mick is charged with 2 counts of embezzling. What fine does he owe?
e. A speeding fine is paid with a $100 bill. How much change is expected?

14. A ping pong tournament is held at the retirement home. If there are 8 ping pong tables and it is a single elimination tournament, how many games are played before a winner is determined?

15. Nurse A changes the linens on 24 beds, Nurse B changes the linens on 15 beds, and Nurse C changes the linens on 31 beds. How many bed linens are changed in all?

16. Each of 5 nurse managers in responsible for 9 nurse technicians. Determine the total number of nurses (including managers and technicians).

17. A psychologist holds 3 therapy sessions per day. How many days will it take to hold 81 sessions at this rate?

18. A nurse technician's day begins at 8:30 am. If a 9 1/2 hour shift is worked, what time does he/she get off work?

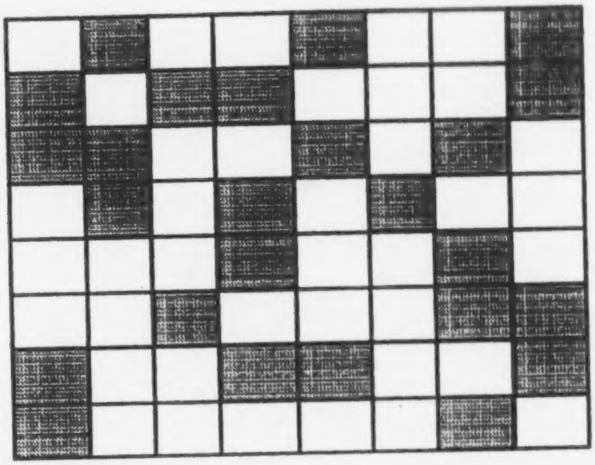
19. The Facts: Number of specific tasks performed over the weekend at Happy Acres

	Friday	Saturday	Sunday
bedpans emptied	10	11	9
bed linens changed	16	18	13
patients bathed	25	28	11

a. How many more linens were changed on Saturday than on Sunday?
b. How many patients were bathed in all this weekend?
c. Determine the total number of tasks completed on Friday.
d. How many more patients were bathed on Friday than on Sunday?
e. Which day had the fewest bedpans emptied?

20. Jim's paycheck shows a gross amount of $181.35. If he worked for 39 hours, what is his hourly rate of pay?

21.



	Across
2	twice seven
3	9 squared
5	11 × 12
6	45 + 25
10	same as 2 across
11	half of 246
13	3/4 = ___%
14	1257 ÷ 3
15	a baker's dozen
17	3 across increased by 6
18	50,284 + 10,709

	Down
1	2 cubed
3	905 - 70
4	square root of 81
6	600 + 143
7	73 × 2
8	24 + 168 + 525
9	300 - 49
12	six thousand, nine hundred, eighty-three
16	5 × 6
19	same as 1 down

22. When changing percents into decimals, move the decimal point to the left 2 places (divide by 100)

When changing percents into fractions, put the percent into the numerator and 100 in the denominator and reduce (percent means "out of a hundred")

When changing fractions into decimals, divide the denominator INTO the numerator

When changing fractions into percents, change it first to a decimal and then move the decimal point 2 places to the right (multiply by 100)

When changing decimals into fractions, put the number over 10, 100, 1000, etc. depending on how many decimal places it has (1 place = 10ths, 2 places = 100ths, etc.)

COMPLETE THE FOLLOWING CHART:

Fraction	1/2	4/5				
Decimal	0.5		0.76		0.03	
Percent	50%			9%		24%

23. Use the clues below to match first name, last name, and occupation.

a. Ms. White is not the writer.
b. Jane and the person named Walker do NOT work for the post office.
c. Jones' first name begins with the same letter as her first name.
d. The writer is NOT a male.

	Jones	Walker	White	teacher	postal clerk	writer
John						
Jane						
Sue						

Posttest

1. 25 × 2

2. 1/4 + 2/5

3. 16 ÷ 4

4. 203 - 197

5. 14 + 27 + 83

6. A residential care facility has 48 residents and 12 full time live-in nurses. How many residents, on the average, are assigned to each nurse?

7. Joe has three children who each have 4 children of their own. How many grandchildren does Joe have?

8. Shady Grove has 110 residents and Windy Meadows has 216. How many residents is this in all?

9. A nurse technician receives a paycheck of $209.10. If this is for 34 hours of work, determine the hourly rate.

10. 25% of the 68 patients have one artificial limb. How many patients would this be?

11. The Facts: Turnover statistics for nurse technicians for 6 months

	Jan	Feb	Mar	Apr	May	June
number hired	4	8	2	3	3	4
number resign	7	0	5	3	0	6

a. What was the net change in the technician staff from Jan through June?
b. If the staff began with 10 at the end of December, how many are on staff at the end of June?
c. How many were hired in all from Jan through June?
d. How many resigned in all from Jan through June?
e. Which month(s) had no one resign?

Pretest Answer Key

1. 350
2. 5808
3. 240
4. 100
5. 6/3 or 2
6. 5.40(38) = $205.20
7. 10(11) = 110 employees
8. 27 - 18 = 9 more
9. 75% or 0.75(36) = 27 are NOT management
10. 156 ÷ 52 = 3 per week
11. a. auto theft
    b. obstruction of justice
    c. 30 days + 3 yrs. + 6 months + 90 days = 3 yrs, 6 mos., 120 days OR approx. 3 yrs. 10 months
    d. 90 - 30 = 60 days more
    e. 8654(3) = $25,692.00

Posttest Answer Key

1. 50
2. 5/20 + 8/20 = 13/20
3. 4
4. 6
5. 124
6. 48 ÷ 12 = 4 residents
7. 3(4) = 12 grandchildren
8. 110 + 216 = 326 residents
9. 209.10 ÷ 34 = $6.15 /hour
10. 0.25(68) = 17 patients
11. a. 4 - 7 + 8 + 2 - 5 + 3 - 3 + 3 + 4 - 6 = 3
    b. 10 + 3 = 13
    c. 4 + 8 + 2 + 3 + 3 + 4 = 24 hired
    d. 7 + 5 + 3 + 6 = 21 resigned
    e. February and May

Review I Answer Key

1. 13
2. 11
3. 20
4. 22
5. 54
6. 116
7. 9
8. 1
9. 5
10. 1
11. 1
12. 24
13. 111
14. 5
15. 21
16. 63
17. 64
18. 40
19. 80
20. 48
21. 77
22. 4
23. 6
24. 41
25. 25
26. 4
27. 1
28. 4

Review II Answer Key

1. 98
2. 5 3/3 or 6
3. 6/7 × 14/12 = 84/84 or 1
4. 0.15(4) = 0.6
5. 5/10 + 2/10 = 7/10
6. 12.14
7. 5.6
8. 8/12 - 3/12 = 5/12
9. 7
10. 64y = 19.2, so y = 0.3 or 30%
11. 2
12. 184
13. 4/9 × 18/1 = 72/9 = 8
14. 0.08(47) = 3.76
15. 39
16. 25
17. 3/28
18. 3 24/30 - 1 5/30 = 2 19/30
19. 27
20. 85y = 34, so y = 0.4 or 40%
21. 35.6
22. 12
23. 152.24
24. 14.84
25. 11
26. 0
27. 2.6
28. 5

Mathematics Curriculum Answer Key

1. 936 ÷ 78 = 12 square miles each
2. 196 - 113 = 83 more
3. 8(4) = 32 shoe stores
4. 131 ÷ 5.24 = 25 hours
5. a. 96 - 67 = 29 more needed
   b. 75% or 0.75(88) = 66
   c. 106 - 95 = 11 more canes
   d. 224 ÷ 32 = 7 per wheelchair
   e. 21 + 37 = 58, so 157 - 58 = 99 are in working order
6. 12
7. 3.5(60) = 210 min., so 210 ÷ 12 = 17.5 or 17 patients
8. 11(13) = 143 min. or 2 hrs. 23 min.
9. 29(3) = 87 min., so 7:00 + 0:87 = 7:87 or 8:27 am
10. 11:38 to 12 noon = 22 min and 12 noon to 12:11 = 11 min., and 22 + 11 = 33 minutes
11. 111 ÷ 37 = 3 visitors per patient
12. M5060, M650, M560, M506, M211, M121, M112, M12
13. a. 51 + 16 + 68 + 98 + 210 + 115 = $558
    b. 115 - 16 = $99 more
    c. grand larceny; loitering
    d. 68(2) = $136
    e. 100 - 51 = $49 change
14. 15
15. 24 + 15 + 31 = 70 beds in all
16. 5(9) = 45 and 45 + 5 = 50 in all
17. 81 ÷ 3 = 27 days
18. 6 pm
19. a. 18 - 13 = 5 more
    b. 25 + 28 + 11 = 64 bathed in all
    c. 10 + 16 + 25 = 51 tasks on Friday
    d. 25 - 11 = 14 more
    e. Sunday
20. 181.35 ÷ 39 = $4.65 per hour

21.

8	▨	1	4	▨	8	1	▨
▨	9	▨	▨	1	3	2	▨
▨	▨	7	0	▨	5	▨	1
7	▨	4	▨	2	▨	1	4
1	2	3	▨	5	6	▨	6
7	5	▨	4	1	9	▨	▨
▨	1	3	▨	▨	8	7	▨
▨	6	0	9	9	3	▨	8

Across

2 twice seven=14
3 9 squared=81
5 11 × 12=132
6 45 + 25=70
10 same as 2 across=14
11 half of 246=123
13 3/4 = ___% =75
14 1257 ÷ 3=419

15 a baker's dozen=13
17 3 across increased by 6=87
18 50,284 + 10,709=60993

Down

1 2 cubed=8
3 905 - 70=835
4 square root of 81=9
6 600 + 143=743
7 73 × 2=146
8 24 + 168 + 525=717
9 300 - 49=251
12 six thousand, nine hundred, eighty-three=6983
16 5 × 6=30
19 same as 1 down=8

22.

Fraction	1/2	4/5	76/100 or 19/25	9/100	3/100	24/100 or 6/25
Decimal	0.5	**0.8**	0.76	**0.09**	0.03	**0.24**
Percent	50%	**80%**	**76%**	9%	**3%**	24%

23. John Walker is the teacher, Jane Jones is the writer, and Sue White is the postal clerk.

	Jones	Walker	White	teacher	postal clerk	writer
John	▨		▨		▨	▨
Jane		▨	▨	▨	▨	
Sue	▨	▨		▨		▨

Pretest

1. 245 - 199
2. 62 × 8
3. 4/5 + 3/8
4. 15% of 12
5. 1.2 ÷ 0.6
6. If there are 12 ambulances in the county and 1/3 of them need repairs, how many do NOT need repairs?
7. A hospital has 110 ambulance attendants. 30% of these are volunteers, how many is this?
8. A speeding ticket costs $52 plus $2.00 for each mile over the posted speed limit. What is the charge for driving 40 mph in a 30 mph zone?
9. An emergency call came in at 8:07 am. If the ambulance arrives at 8:19 am, how long did it take to get there?
10. If 13 cervical collars are used in one week and each one costs $10.95, what is the cost of cervical collars for this week?
11. The Facts: Number of emergency calls to 911 by category

	Monday	Tuesday	Wednesday	Thursday	Friday
Heart	3	4	2	0	2
Broken Bone	3	0	2	1	3
Car Accident	2	6	0	4	2

a. How many calls were there in all on Monday?
b. How many calls were there in all for the entire week?
c. How many more calls were there on Tuesday than on Friday?
d. How many car accident call were there in all for the week?
e. Which day of the week had the fewest emergency calls to 911?

Math Skills Review I

1. 2 + 4
2. 3 + 9
3. 6 + 2 + 4
4. 15 + 0
5. 7 + 1 + 8
6. 12 + 13
7. 24 + 8
8. 10 - 6
9. 8 - 2
10. 11 - 4
11. 34 - 12
12. 5 - 5
13. 12 - 6
14. 4 - 3 - 1
15. 6 × 9
16. 7 × 7
17. 5 × 3 × 2
18. 4 × 14
19. 24 × 3
20. 10 × 11
21. 106 × 4
22. 70 ÷ 10
23. 54 ÷ 9
24. 81 ÷ 9
25. 24 ÷ 6
26. 10 ÷ 2
27. 15 ÷ 1
28. 12 ÷ 12

Math Skills Review II

1. 1.14 + 0.23
2. ____% of 84 is 21
3. 5 2/3 - 4 2/3
4. 204 + 73

5. 121 + 6382
6. 24.5 ÷ 5
7. 15 + 26 + 1
8. 10% of 147

9. 0.2 × 12
10. 1/5 + 5/6
11. 18 - 12 - 5
12. 1/3 + 1/3 + 1/3

13. 15% of 26
14. 2.45 + 0.68
15. 271 - 163
16. 8 × 6

17. 15.075 ÷ 2.5
18. 10.804 - 1.25
19. 12 × 14
20. 7/8 - 1/2

21. 18 + 10.4
22. 23.4 × 0.45
23. 1 1/2 + 3 1/2
24. 124 ÷ 4

25. 0.78 - 0.123
26. 75 - 54
27. 2/5 × 3/7
28. 100 + 100

Mathematics Curriculum

1. Half of the 48 ambulance attendants regularly forget to wear latex gloves. How many is this?

2. A speeding ticket costs $42 plus $3.00 for each mile over the posted speed limit. What is the charge for going 65 mph in a 40 mph zone?

3. Staff training costs $15 per 3 hour session. If 12 hours are required per year to retain certification , what is the cost?

4. An emergency call comes in at 11:46 pm. If the ambulance responds in 16 minutes, what time does it arrive at the scene?

5. The Facts: Medical inventory in stock:

latex gloves - 715 pair	ace wraps - 58	penicillin - 400 cc
bandages - 146	syringes - 213	cervical collars - 99

   a. If one dose of penicillin is 10 cc, how many doses are in stock?
   b. How many more syringes are there than bandages?
   c. Determine the number of individual latex gloves.
   d. Each cervical collar has a retail cost of $9.25. Determine the cost of all the collars in stock.
   e. A soccer team comes in to the ER after the big game, and 50% of the ace wraps are needed. How many remain in stock?

6. A hospital employs 136 people. 25% of those employees are in management. How many employees are NOT in management?

7. The sheriff's office issues 98 traffic tickets in one week. If 43 of these are speeding tickets and the rest are for careless driving, how many tickets are issued for careless driving?

8. Volunteers at the hospital are required to get 9 hours of training during each year. If a person has been with the hospital for 4 years, how many hours of training should he/she have received?

9. An ambulance gets, on the average, 21 miles per gallon. How many gallons will it take to go 126 miles?

10. Ambulance 328 brings in 45 patients in one week. Ambulance 106 brings in 63 patients during the same week. How many more patients are brought in by Ambulance 106?

11. The Facts: Volunteer Ambulance Attendant "on call" schedule for April 8-12:

	Monday	Tuesday	Wednesday	Thursday	Friday
Bubba	7a-7p	7a-7p	7a-7p	off	7a-7p
Sammy	10a-10p	off	10a-10p	10a-10p	10a-10p
Marsha	8p-8a	8p-8a	off	8p-8a	8p-8a

a. Who is on call on Friday at 9 pm?
b. How many hours are scheduled for each volunteer for the week?
c. Each attendant is on call for a ____hour time period per day.
d. Who might respond to an emergency at 11 am on Monday?
e. Which volunteer in on call during the nighttime hours?

12. For every doctor on staff at the hospital, there are 4 volunteers. If there are 33 doctors, then how many volunteers are there?

13. The county employs 37 paramedics. If three of them resign and five more are hired, how many are employed now?

14. Each ambulance stocks 4 cervical collars and 3 backboards for spinal injuries. If there are 10 ambulances, how many cervical collars and backboards are there?

15. A hospital has four floors of patient rooms. If there are a total of 68 patient rooms, how many are there on each floor?

16. Each county medical supervisor is responsible for 8 volunteer ambulance attendants. If there are 7 supervisors, how many volunteers are there?

17. The Facts: Counties in the Metro area and the number of medical personnel each:

Jamesian Co. - 110
Putman Co. - 167
Beech Co. - 128
Mooney Co. - 203
Harris Co. - 96
Asher Co. - 59

a. If the number of medical personnel is directly proportional to the county size, which county seems to be the largest county in the Metro area?
b. How many more medical personnel are there in Putman Co. than in Harris Co.?
c. Determine the total number of medical personnel in this Metro area.
d. Which county has the fewest medical personnel?
e. 25% of the Beech Co. personnel are volunteers, how many are NOT?

18. 343 calls came in to 911 operators during one week. If there were seven different operators, how many calls, on the average, did each one receive?

19. A call comes in to 911 at 11:48 am. If an ambulance responds in 17 minutes, what time will it be?

20. Hospital A has 193 employees and Hospital B has 217 employees. How many fewer employees are there at Hospital A?

21. Use the clues below to match first name, last name, and occupation of each person.

	Mooney	Adams	Fox	Doctor	Mechanic	Sheriff
Fabio						
Sheila						
Bubba						

a. No person's first and last name or occupation begin with the same letter.
b. Mr. Mooney is not the mechanic.
c. Fabio and Ms. Fox are neither one the doctor.
d. The doctor is named Mooney.

22. Locate the solutions to the problems in the number puzzle. Solutions may be horizontal, vertical, or diagonal.

528 + 1063 + 27

900 ÷ 36

8 squared

14 × 10

1076 - 985

5 cubed

5 × 4 ÷ 2 + 18 - 1

5	1	0	4	7	1
1	4	3	2	9	5
2	0	6	3	5	2
4	8	6	2	8	1
1	6	1	8	0	9
7	4	5	6	9	7

23. Use inductive reasoning (observe the patterns) and see if you can name the next two numbers (or letters) in the pattern.

a. 1, 4, 9, 16, ___, ___
b. 2, 6, 3, 7, 4, 8, 5, ___, ___
c. O, T, T, F, F, S, S, ___, ___
d. 5, $^{-}10$, 20, $^{-}40$, ___, ___
*e. 1/2, 2/3, ___, ___, 5/6, 6/7

Posttest

1. 116 + 4
2. 20 × 12
3. 3/4 + 8/9
4. 4 cubed
5. 206.4 - 10.23
6. 175 patients enter the ER in one week. If there are 5 trauma rooms, how many patients, on the average, were in each room?
7. A ticket for speeding costs $48 plus $1.75 for each mile over the posted speed limit. What is the charge for driving 33 mph in a 20 mph zone?
8. A call comes in to 911 at 7:49 am. If the ambulance responds in 14 minutes, what time does it arrive?
9. Bandaids are packaged 24 to a box. If 444 are to be packaged, how many boxes are needed?
10. Each of 11 ambulances is assigned 3 attendants. How many attendants is this in all?
11. The Facts: 911 Emergency call by demographic group

	Monday	Tuesday	Wednesday	Thursday	Friday
child	8	2	4	6	5
adult female	3	4	5	0	7
adult male	0	6	2	2	1

a. How many calls were there in all this week?
b. How many fewer calls were there on Thursday than on Friday?
c. How many calls came in altogether on Monday?
d. How many calls came in this week involving an adult female?
e. Which demographic group had the most calls to 911 this week?

Pretest Answer Key

1. 46
2. 496
3. 32/40 + 15/40 = 47/40 or 1 7/40
4. 0.15(12) = 1.8
5. 2
6. 2/3 or (2/3)(12) = 8 ambulances
7. 0.30(110) = 33 volunteers
8. 52 + 2(10) = 52 + 20 = $72.00
9. 8:19 - 8:07 = 12 minutes
10. 10.95(13) = $142.35
11. a. 3 + 3 + 2 = 8

    b.3+3+2+4+6+2+2+1+4+2+3+2 = 34

    c. 10 - 7 = 3

    d. 2 + 6 + 0 + 4 + 2 = 14

    e. Wednesday

Posttest Answer Key

1. 29
2. 240
3. 27/36 + 32/36 = 59/36 or 1 23/36
4. 4 × 4 × 4 = 64
5. 196.17
6. 175 ÷ 5 = 35 patients per room
7. 48 + 1.75(13) = 48 + 22.75 = $70.75
8. 7:49 + 0:14 = 7:63 or 8:03 am
9. 444 ÷ 24 = 18.5, so 19 boxes are needed
10. 11(3) = 33 attendants
11. a. 8+3+2+4+6+4+5+2+6+2+5+7+1 = 55
    b. 13 - 8 = 5 fewer
    c. 8 + 3 + 0 = 11
    d. 3 + 4 + 5 + 0 + 7 = 19
    e. children = 25 calls

Review I Answer Key

1. 6
2. 12
3. 12
4. 15
5. 16
6. 25
7. 32
8. 4
9. 6
10. 7
11. 22
12. 0
13. 6
14. 0
15. 54
16. 49
17. 30
18. 56
19. 72
20. 110
21. 424
22. 7
23. 6
24. 9
25. 4
26. 5
27. 15
28. 1

Review II Answer Key

1. 1.37
2. 84y = 21, so y = 0.25 or 25%
3. 1
4. 277
5. 6503
6. 4.9
7. 42
8. 0.10(147) = 14.7
9. 2.4
10. 6/30 + 25/30 = 31/30 or 1 1/30
11. 1
12. 3/3 or 1
13. 0.15(26) = 3.9
14. 3.13
15. 108
16. 48
17. 6.03
18. 9.554
19. 168
20. 7/8 - 4/8 = 3/8
21. 28.4
22. 10.53
23. 4 2/2 or 5
24. 31
25. 0.657
26. 21
27. 6/35
28. 200

Mathematics Curriculum Answer Key

1. (1/2)(48) = 24
2. 42 + 3(25) = 42 + 75 = $117.00
3. 12 ÷ 3 = 4 sessions, so $15(4) = $60.00
4. 11:46 + 0:16 = 11:62 or 12:02 am
5. a. 400 ÷ 10 = 40 doses
   b. 213 - 146 = 67
   c. 715(2) = 1430 individual gloves
   d. 99(9.25) = $915.75
   e. 50% or 0.50(58) = 29
6. 75% or 0.75(136) = 102
7. 98 - 43 = 55
8. 9(4) = 36 hours
9. 126 ÷ 21 = 6 gallons
10. 63 - 45 = 18
11. a. Sammy and Marsha
    b. Bubba 12(4) = 48 hrs AND Sammy 12(4) = 48 hrs AND Marsha 12(4) = 48 hrs
    c. 12 hours
    d. Bubba or Sammy
    e. Marsha
12. 33(4) = 132 volunteers
13. 27 - 3 + 5 = 29
14. 10(4) = 40 cervical collars AND 10(3) = 30 backboards
15. 68 ÷ 4 = 17 rooms per floor
16. 7(8) = 56 volunteers
17. a. Mooney Co.
    b. 167 - 96 = 71 more
    c. 110 + 96 + 203 + 128 + 167 + 59 = 763
    d. Asher Co.
    e. 75% or 0.75(128) = 96
18. 343 ÷ 7 = 49 calls each
19. 11:48 + 0:17 = 11:65 or 12:05 pm
20. 217 - 193 = 24 fewer
21. Fabio Adams is the sheriff, Sheila Fox is the mechanic, and Bubba Mooney is the doctor.

	Mooney	Adams	Fox	Doctor	Mechanic	Sheriff
Fabio	▨		▨	▨	▨	
Sheila	▨	▨		▨		▨
Bubba		▨	▨		▨	▨

22. 528 + 1063 + 27 = 1618

900 ÷ 36 = 25

8 squared = 64

14 × 10 = 140

1076 - 985 = 91

5 cubed = 12

5 × 4 ÷ 2 + 18 - 1 = 27

5	**1**	0	4	**7**	1
1	**4**	3	**2**	9	5
2	**0**	6	3	**5**	2
4	**8**	6	**2**	**8**	**1**
1	**6**	**1**	**8**	0	**9**
7	**4**	5	6	9	7

23. a. each entry is a perfect square:
$1^2 = \mathbf{1}$, $2^2 = \mathbf{4}$, $3^2 = \mathbf{9}$, $4^2 = \mathbf{16}$, so $5^2 = \underline{\mathbf{25}}$ and $6^2 = \underline{\mathbf{36}}$ are the next two entries

b. add four then subtract three to create this pattern:
2 + 4 =**6** - 3 = **3** + 4 = **7** - 3 = **4** + 4 = **8** - 3 = **5** + 4 = **9** - 3 = **6**, and so on

c. notice the first letters of each of the number words!!
One, Two, Three, Four, Five, Six, Seven, Eight, Nine, and so on

d. multiply each number by ⁻2 to get the next term:
$\mathbf{5} \times {}^{-}2 = {}^{-}\,\mathbf{10} \times {}^{-}2 = \mathbf{20} \times {}^{-}2 = \mathbf{40} \times {}^{-}2 = \underline{\mathbf{{}^{-}80}} \times {}^{-}2 = \underline{\mathbf{160}}$, ...

e. 1/2, 2/3, 3/4, 4/5, 5/6, 6/7, ...

Pretest

1. 24 + 76 + 101

2. 276 - 199

3. 16 × 16

4. 2/3 × 4/5

5. 10 ÷ 0.05

6. If hostages are held from 5 am until 3 pm, how long is this?

7. The coffee pot requires 3 scoops of coffee to 12 cups of water. How many scoops of coffee would be needed for 1/2 of a pot (6 cups of water)?

8. An employee produces 15 widgets per hour. At this rate, how many can be produced in a 40 hour work week?

9. Joe has been employed by the ABC Company for 27 years. Sue has been employed by ABC for 19 years. How many more years has Joe been employed with them than Sue?

10. If there are 783 suggestions in the suggestion box and they are read by nine managers, how many will each manager read, on the average?

11. The Facts: Material Handlers Team Schedule for Monday through Friday

	Monday	Tuesday	Wednesday	Thursday	Friday
Sylvia	8a-5p	8a-5p	off	8a-5p	8a-5p
Malcolm	off	9a-6p	9a-6p	9a-6p	8a-5p
Bo	10a-7p	10a-7p	8a-5p	off	off

a. How many hours are scheduled for Bo to work this week?
b. How many more hours are scheduled for Sylvia than for Bo?
c. If Malcolm makes $11 per hour, what is his expected gross paycheck amount for this week?
d. Who is scheduled to be working at 9 am on Tuesday?
e. How many hours are scheduled for the entire team for this week?

Math Skills Review I

1. 7 + 8
2. 6 + 5
3. 2 + 4 + 6
4. 10 + 12
5. 25 + 11
6. 35 + 63
7. 15 + 7
8. 8 - 6
9. 4 - 3
10. 11 - 7 - 4
11. 10 - 7
12. 5 - 3
13. 7 - 2
14. 25 - 18
15. 2 × 4
16. 7 × 6
17. 5 × 3
18. 2 × 2 × 4
19. 3 × 7
20. 9 × 9
21. 12 × 7
22. 56 ÷ 7
23. 120 ÷ 40
24. 60 ÷ 5
25. 14 ÷ 2
26. 36 ÷ 9
27. 27 ÷ 9
28. 28 ÷ 14

Math Skills Review II

1. 34.7 - 8.63
2. 10% of ___ is 13
3. 245 + 113
4. 14% of 73

5. 68 ÷ 0.02
6. 15 ÷ 0.3
7. 8.45 × 9.2
8. 1/5 + 2/9 + 3/5

9. 21 - 4 - 7
10. 65 + 47 + 16
11. 5% of 80
12. 72 ÷ 8

13. 4.5 × 0.7
14. 24.6 + 1.837
15. 10 + 2 + 5 + 7
16. 5.6 ÷ 7

17. 60% of 124
18. 5/6 ÷ 3/18
19. 4% of 78
20. 4003 - 2963

21. 9 × 16
22. 107 - 96
23. 1236 + 2470
24. 50% of ___ is 18

25. 17 squared
26. 23 × 15
27. 64 × 0.3
28. 100 ÷ 4

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Mathematics Curriculum

1. A warehouse has in stock 4500 nuts and 3604 bolts. If 3463 nuts and 1299 bolts are shipped out, how many of each remain in stock?

2. From one end of the plant to the other it measures 1/2 mile. If 5 trips are made back and forth, how many miles have been walked?

3. The Facts: Fastener Specifications are 13.6 ± 0.7 cm
To determine the scrap rate, you determine the number of fasteners that do not meet specifications and divide this by the total number manufactured. If the scrap rate ≥ 25%, then the machine needs maintenance attention.

Fastener data collected at machine #1

13.6	13.7	14.29	13.6
13.6	14.4	14.5	13.7
12.9	14.3	13.9	12.95
13.0	12.8	13.9	14.2
13.25	13.5	12.6	14.1

a. What is the acceptable range for this fastener size?
b. How many pieces of the data do not meet the specifications?
c. What is the scrap rate (in percent or fraction form)?
d. Does this machine need maintenance attention? Why or why not?
e. If the specifications changed to 13.6 ± 0.5 cm, what would the new scrap rate be?

4. A company provides a suggestion box for its employees. If 315 suggestions are placed in the box over a 9 day period, how many is this, on the average, per day?

5. Strong coffee requires 5 scoops of coffee per every 12 cups of water. How many scoops of coffee are required if you are mixing it with 30 cups of water?

6. If a plant has 3 "hot jobs" (emergencies) that occur each day for 13 days, how many is this in all?

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7. The Facts: Employee Schedule for Monday through Saturday

▨	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Pauline	9a-6p	10a-7p	off	10a-7p	9a-6p	8a-5p
Herbert	10a-7p	off	10a-7p	off	10a-7p	10a-7p
Anna	9a-6p	9a-6p	9a-6p	9a-6p	off	9a-6p
Jose	8a-5p	8a-5p	8a-5p	8a-5p	8a-5p	off

a. How many employees are scheduled to be working at 9:30 am on Monday? Who are they?
b. How many hours are scheduled for Pauline this week?
c. How many more hours are scheduled for Jose than for Herbert?
d. If employees are paid overtime wages for working more than 40 hours per week, who will NOT be receiving any overtime pay?
e. If Anna takes a 30 minute lunch each day she is scheduled to work, how many hours does she spend working (not lunching)?

8. A hostage situation occurs in a manufacturing plant. Hostages are held for 9 1/2 hours beginning at 7:45 am. At what time are they released?

9. Items are stocked 15 boxes to a shelf. How many boxes are there if 13 shelves are stocked full?

10. The Facts: An employee has the following daily schedule:

7a-10a	taking phone orders
10a-11:30a	emergency orders
11:30a-noon	lunch
12p-3p	driving forklift - filling orders
3p-4p	miscellaneous paperwork

a. How long is the scheduled work day (including lunch)?
b. What fraction of the day is spent taking phone orders?
c. What fraction of the day is spent eating and taking care of emergency orders?
d. If this employee is paid $7.75 per hour, excluding lunch, what is the expected wage?
e. What percent of the day is spent on miscellaneous paperwork?

11. Mervin has been employed with a company for 33 years. Sharon has been employed with the same company for 27 years. How many more years does Mervin have with the company than Sharon?

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12. Employees are paid double time for each hour over 40 weekly hours. If an employee is paid $9.50 per hour and works 47 hours in one week, what is the expected gross paycheck amount?

13. A plant manufactures 202 fasteners per hour. How many fasteners can be produced in 17 hours?

14. The Facts: USA Mileage Chart (for one way trips!)

	Atlanta, GA	St. Louis, MO	Los Angeles, CA	Nashville,TN	New York,
Atlanta, GA	0	541	2182	242	841
St. Louis, MO	541	0	1845	299	948
Los Angeles, CA	2182	1845	0	2025	2786
Nashville, TN	242	299	2025	0	892
New York, NY	841	948	2786	892	0

a. How many miles is a round trip between Atlanta and St. Louis?
b. A truck driver makes it from Nashville to Los Angeles in 40 hours. What is the average rate of speed (mph)?
c. How many more miles are there between New York and Nashville than between New York and Atlanta?
d. According to the chart above, which cities are the farthest apart? closest together?
e. If a driver travels 55 mph, approximately how long will it take to go from St. Louis to Los Angeles?

15. A manufacturing plant divides its employees into teams. If there are 16 teams with 7 employees each, how many employees are there?

16. A company employs 8 managers and 216 non-managerial employees. Each manager is a team leader. How many non-managerial employees are there on each manager's team?

17. Place the following fasteners in order from smallest to largest according to their measurement 12.46 cm, 12.435 cm, 13.5 cm, 11.7 cm, 13.48 cm, 13.51 cm.

18. A box contains [illegible] short fasteners, 12 medium length fasteners, and 9 long fasteners. What is the probability of reaching into the box and pulling out one long fastener?

19. Sixteen delivery trucks leave the plant with 11 planned destinations each. If all of the drivers complete their scheduled routes, how many destinations were reached?

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20. The ABC Company employs 116 people. 25% of them are in management. How many employees are NOT in management?

21. Use the clues below to match the work title, with the first and last names of the employees.

	Todd	Polly	Lana	Jackson	James	Turner
Plant Manager						
Materials Handler						
Delivery Person						

1. The plant manager and Lana are not Mr. Turner.
2. The delivery person is a female.
3. Ms. Jackson and the delivery person are sisters.

22. Probability is the mathematical study of chance. The probability that an event will occur is given by a ratio. The numerator is the number of times that the specific event can occur and the denominator is the total number of events. For example, a bag contains 3 red marbles, 4 blue marbles, and 3 black marbles. The probability of drawing out a blue marble is: P(blue) = 4/10. The probability of getting a black marble is: P(black) = 3/10.

When a normal six-sided die (1/2 of a pair of dice!) is tossed, what is the probability of rolling :

a. a two?
b. an even number?
c. a one or a five?
d. a number less than 7?
e. a number greater than 7?

23. Find the solutions to the problems below in the number puzzle. Answers may appear horizontally, vertically, or diagonally

9 squared
10 increased by 307
4000 - 2986
24 + 76
2479 × 0
the square root of 400
400 decreased by 1

8	5	7	8	5	0
1	4	9	4	9	6
0	9	1	5	8	7
3	6	2	0	6	1
5	2	3	0	0	3
4	1	0	1	4	2

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Posttest

1. 15.4 + 0.267
2. 834 - 799
3. 24 × 0.6
4. 112 ÷ 4
5. 1/2 + 5/6
6. An employee makes $10.00 per hour up to 40 hours and then time and a half for each hour over 40. What is the gross pay expected for a 49 hour work week?
7. A company manufactures nuts and bolts. If 346,824 bolts are produced and 4 times as many nuts are produced, how many nuts is this?
8. If hostages are held for 10 hours beginning at 8 am, what time are they released?
9. A one way trip to France from the USA is 5240 miles. How many miles is a round trip?
10. A company employs 176 people. If each person puts 3 suggestions into the suggestion box, how many is this for someone to read?
11. The Facts: Material Handlers Team Schedule for Monday through Friday

▨	Monday	Tuesday	Wednesday	Thursday	Friday
Sam	8a-6p	8a-6p	off	8a-6p	off
Mitch	9a-6p	off	8a-5p	8a-5p	8a-5p
Carol	10a-7p	10a-7p	10a-7p	off	9a-6p

a. How many hours are scheduled for Mitch to work this week?
b. How many more hours are scheduled for Carol than for Sam?
c. If Sam makes $10.75 per hour, what is his expected gross paycheck amount for this week?
d. Who is scheduled to be working at 8:30 am on Monday?
e. How many hours are scheduled for the entire team for this week?

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Pretest Answer Key

1. 201
2. 77
3. 256
4. 8/15
5. 200
6. 10 hours
7. 1/2 (3) = 1 1/2 scoops
8. 15(40) = 600 widgets
9. 27 - 19 = 8 more years
10. 783 ÷ 9 = 87 per manager
11.
    a. 10a-7p = 9 hrs., 8a-5p = 9 hrs., so Bo = 9(3) = 27 hours

    b. 8a-5p = 9 hrs., so Sylvia = 9(4) = 36 hrs., and 36 - 30 = 6 more hrs.

    c. 9(4) = 36 hours and 36(11) = $396.00

    d. Sylvia and Malcolm

    e. Sylvia = 36, Malcolm = 36, and Bo = 27, so the entire team is 36 + 36 + 27 = 99 hours

Posttest Answer Key

1. 15.667
2. 35
3. 14.4
4. 28
5. 3/6 + 5/6 = 8/6 = 1 2/6 or 1 1/3
6. 10(40) + 10(1.5)(9) = 400 + 135 = $535.00
7. 346824(4) = 1,387,296 nuts
8. 6 pm
9. 5240(2) = 10,480 miles
10. 176(3) = 528 suggestions
11.
    a. 9a-6p = 9 hrs., 8a-5p = 9 hrs., so 9 × 4 = 36 hours

    b. 10a-7p = 9 hrs., 8a-6p = 10 hrs., so Carol = 36 hrs. and Sam = 30 hrs, and 36 - 30 = 6 more hrs.

    c. 30(10.75) = $322.50

    d. Sam

    e. Sam = 30, Mitch = 36, and Carol = 36, so the entire team is 30 + 36 + 36 = 102 hours

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Skills Review I Answer Key

1. 15
2. 11
3. 12
4. 22
5. 36
6. 98
7. 22
8. 2
9. 1
10. 0
11. 3
12. 2
13. 5
14. 7
15. 8
16. 42
17. 15
18. 16
19. 21
20. 81
21. 84
22. 8
23. 3
24. 12
25. 7
26. 4
27. 3
28. 2

Skills Review II Answer Key

1. 26.07
2. 0.10y = 13, so y = 130
3. 358
4. 0.14(73) = 10.22
5. 3400
6. 50
7. 77.74
8. 4/5 + 2/9 = 36/45 + 10/45 =
46/45 or 1 1/45
9. 10
10. 128
11. 0.05(80) = 4
12. 9
13. 3.15
14. 26.437
15. 24
16. 0.8
17. 0.60(124) = 74.4
18. 5/6 × 18/3 = 90/18 or 5
19. 0.04(78) = 3.12
20. 1040
21. 144
22. 11
23. 3706
24. 0.50y = 18, so y = 36
25. 17(17) = 289
26. 345
27. 19.2
28. 25

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Mathematics Curriculum Answer Key

1. 4500 - 3463 = 1037 nuts, and 3604 - 1299 = 2305 bolts
2. 5(1/2) = 5/2 or 2 1/2 miles
3.
    a. from 12.9 up to 14.3
    b. 4
    c. 4/20 or 20%
    d. no, the scrap rate was less than 25%
    e. 10/20 or 50%
4. 315 ÷ 9 = 35 suggestions per day
5. 30 ÷ 12 = 2.5 and 2.5(5) = 12.5 scoops
6. 3(13) = 39 emergencies
7.
    a. 3; Pauline, Anna, and Jose
    b. 9a-6p = 9 hrs., 10a-7p - 9 hrs., 8a-5p = 9 hrs., so 9 × 5 = 45 hours
    c. Jose 9 × 5 = 45 and Herbert 9 × 4 = 36, so 45 - 36 = 9 more hours
    d. Herbert
    e. 45 - 5(1/2 hr) = 45 - 2.5 = 42.5 hours
8. 5:15 pm
9. 15(13) = 195 hours
10.
    a. 7 am - 4 pm = 9 hours
    b. 3/9 = 1/3 of the day
    c. 10 am - 12 noon = 2 hours, so 2/9 of the day
    d. 9 - 1/2 = 8 1/2 hours and 8 1/2 (7.75) = $65.88
    e. 1/9 = 11.1%
11. 33 - 27 = 6 years
12. 40(9.50) + 7(2)(9.50) = 380 + 133 = $513.00
13. 202 × 17 = 3434 fasteners
14.
    a. 541(2) = 1082 miles
    b. 2025 ÷ 40 = 50.625 mph
    c. 892 - 841 = 51 more miles
    d. farthest is between New York and Los Angeles and closest is between Nashville and Atlanta
    e. 1845 ÷ 55 = 33.5 hours
15. 16 × 7 = 112 employees in all
16. 216 ÷ 8 = 27 employees per team
17. 11.7 cm, 12.435 cm, 12.46 cm, 13.48 cm, 13.5 cm, 13.51 cm
18. 9/31 or 29.03%
19. 16(11) = 176 destinations
20. 75% = 0.75(116) = 87 non-managerial employees

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21.

	Todd	Polly	Lana	Jackson	James	Turner
Plant Manager	▨		▨		▨	▨
Materials Handler		▨	▨	▨	▨	
Delivery Person	▨	▨		▨		▨

Plant Manager is Polly Jackson
Materials Handler is Todd Turner
Delivery Person is Lana James

22. a. P(2) = 1/6 or 16.6%
b. P(even number) = P(2, 4, 6) = 3/6 or 50%
c. P(1 or 5) = 2/6 or 1/3 or 33.3%
d. P(number less than 7) = P(1, 2, 3, 4, 5, 6) = 6/6 or 100%
e. P(number greater than 7) = 0/6 or 0%

23. 9 squared = 81
10 increased by 307 = 317
4000 - 2986 = 1014
24 + 76 = 100
2479 × 0 = 0
the square root of 400 = 20
400 decreased by 1 = 399

8	5	7	8	5	0
1	4	9	4	9	6
0	9	1	5	8	7
3	6	2	0	6	1
5	2	3	0	0	3
4	1	0	1	4	2

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Pretest

1. 84 + 39 + 26

2. 4783 - 4005

3. 17 × 18

4. 164 ÷ 40

5. 1/4 ÷ 2/3

6. A company has 9 different departments. If each department has 8 employees, how many employees are there in all?

7. A customer is told to call in 48 hours to check on a repair. How many days is this?

8. If each of 3 people at the service window takes in 12 repairs, how many repairs is this in all?

9. If there are 146 replacement parts in inventory and 99 repairs are made (each using one of the replacement parts), how many parts remain in stock?

10. An employee begins the day at 6:45 am and gets off at 4:15 pm. How many hours have been worked?

11. The Facts: A VCR Repair shop notes work orders with the following codes and costs:

#1 - eject button - $10
#2 - rewind failure - $15
#3 - fast forward mishap - $15
#4 - complete tune up - $40
#5 - won't play at all! - $30

a. Determine the cost of repairs for #1 and #3.
b. Determine the cost of repairs for #2 and #5.
c. What is the cost of a complete tune up?
d. Is it cheaper to repair the fast forward mishap or the eject button?
e. If the repair bill is $30, what might have been repaired?

Math Skills Review I

1. 10 + 6
2. 3 + 5 + 4
3. 2 + 7
4. 1/4 + 2/4
5. 0.7 + 0.8
6. 9 + 3
7. 4 + 0 + 16
8. 10 - 8
9. 14 - 7
10. 7 - 2 - 4
11. 7/8 - 3/8
12. 4.5 - 3.2
13. 45 - 15
14. 30 - 6
15. 2 × 6
16. 3 × 5 × 4
17. 11 × 5
18. 1/2 × 3/4
19. 15 × 0.6
20. 12 × 13
21. 47 × 2
22. 72 ÷ 12
23. 54 ÷ 9
24. 18 ÷ 9
25. 0.8 ÷ 0.8
26. 5 ÷ 1/2
27. 10 ÷ 2
28. 6 ÷ 1

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Math Skills Review II

1. 25 + 76
2. 10 × 10
3. 18 ÷ 10.7
4. 1/5 + 2/5 + 3/5

5. 64 ÷ 0.8
6. 2/7 + 1/8
7. 24.6 - 1.845
8. 43 × 1.2

9. 4/9 - 1/5
10. 18 ÷ 5
11. 2/3 × 2/3
12. 5004 - 3986

13. 453 - 199
14. 0.38 + 1.4
15. 1/2 ÷ 1/2
16. 17 × 15

17. 175 × 6
18. 47 - 36 - 11
19. 104 + 716
20. 43.5 ÷ 5

21. 273 + 18 + 6
22. 1.6 × 0.9
23. 1 1/3 - 2/3
24. 0.3 × 1.4 × 7

25. 125 ÷ 25
26. 16.4 - 0.78
27. 27 ÷ 9
28. 64.7 + 0.25

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Mathematics Curriculum

1. A TV repair shop keeps picture tubes in stock. On Monday they had 416 in inventory. On Tuesday 33 were used in repairs and on Wednesday and Friday 17 were used each day. How many remain in stock?

2. The Facts: The following items were repaired in one week at Al's Repair Shop

16 VCR's
20 TV's
19 can openers
2 electric toothbrushes
8 vacuum cleaners
41 radios

 a. How many more can openers than vacuum cleaners were repaired?
 b. If the cost of a VCR repair averages $21.50, what was the cost of all VCR repairs for this week?
 c. Al's Repair Shop makes $8.00 profit on each repair. How much profit was made this week?
 d. How many repairs on electric toothbrushes, radios, and televisions were there this week?
 e. Repairing a radio takes approximately 20 minutes. How many minutes were spent repairing radios this week at Al's?

3. Determine the cost of five combo meals at the local taco stand if one costs $2.59.

4. The temperature outside is 36 degrees Fahrenheit. If it is 38 degrees F warmer inside the repair shop, what is the temperature inside?

5. A video camera is taken in for repairs on Tuesday at 1:00 pm. The customer is told to call in 44 hours to check on the status of the repair. At what time should the customer call?

6. A manufacturer trains 223 repair shops to repair its can opener. If each repair shop repairs 89 of the can openers, how many is this in all?

7. The repair department has 45 employees. If they are divided into 5 member teams, how many teams will there be?

8. A company employs 488 people. 75% of the employees are certified repair people. How many of the employees are NOT certified repair people?

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9. The Facts: Inventory count for Mary's Electronic Repair

switches - 215
motors - 301
dials - 176
3 mm insulated wire - 423 ft.
5 mm insulated wire - 106 ft.
outlets - 199

a. How many more motors are there than outlets?
b. If dials sell for $1.19 each, what is the total inventory of dials worth?
c. How many more feet of 3 mm wire is there than 5 mm wire?
d. An employee uses 315 ft. of 3 mm wire, how much of the 3 mm wire remains?
e. How many switches and dials are there in all?

10. A TV repair costs $35.00 on the average. What is the cost of repairing 130 TV's?

11. The Facts: Taco Tunnel Menu:

taco $0.89
burrito $1.29
tostita $1.70
fajitas $4.50
taco salad $2.39
combo meal (2 tacos, 1 burrito) $2.59

a. Determine the cost of two dozen tostitas.
b. What is the difference in the cost of 1 combo meal or each item in the combo meal purchased separately?
c. What is the change expected from a $10 bill if you purchase 2 taco salads and 3 burritos.
d. How much more is 3 tacos than 2 burritos?
e. You have $7.50 to spend. What can you purchase?

12. Determine the total cost of a can opener repair if the ticket shows the following:

diagnosis	$24.95
parts	$ 3.65
sales tax	6%
TOTAL =	????

13. Each department in the company employs 14 people. There are 126 total employees in the company. How many different departments are there?

14. The temperature in the electronics repair area must be strictly regulated. It must remain 65 degrees Fahrenheit ± 2.4 degrees. What is the range of acceptable temperatures?

15. There are 728 capacitors in stock. On Monday 120 are used. Twice as many as this are used on Tuesday. On Wednesday 25% of those that remain are used. How many capacitors are left?

16. There are presently 146 transistors used each week on radio repairs. How many are needed for the whole year? (1 year = 52 weeks)

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17. It takes approximately 1 hour and 20 minutes to repair one VCR. If repairs begin at 8:00 am, at what time will the repairs of all 5 VCR's be completed?

18. The Facts: The following brands of TV's (and the number repaired) are repaired at ABC Electronics Repair in one month:

Magnavox - 15	Zenith - 65
RCA - 8	Sony - 1
Sharp - 12	GE - 32

a. How many more Zenith sets were repaired than RCA?
b. How many fewer Sony's than GE's were repaired?
c. Which TV brand appears to need more repairs than any other?
d. How many TV repairs were there in all this month?
e. 50% of the Sharp TV's repaired were black and white sets, how many is this?

19. Jane works at Jill's Repair Shop. She works 46 1/2 hours in one week. Jane is paid $10 per hour up to 40 hours and $12.50 for every hour over 40. What is her expected gross paycheck amount?

20. How many color TV's can be purchased with $1000.00 if each one costs $119.00 (including tax).

21. Work the problems below to decode the quote.

___   ___ ___ ___ ___   ___ ___ ___ ___ ___ ___ ___   ___ ___   ___ ___ ___
10   15 8 8 4   2 13 10 14 20 31 2   40 1   33 17 2

___ ___ ___ ___   ___ ___ ___ ___ ___ ___ .
3 2 1 33   1 2 5 14 8 9

Thomas Fuller

A	2 × 5	J	9 × 5 - 1	S	3/4 + 1/4
B	9 - 6	K	6 × 4	T	3 × 11
C	$7^2 + 1$	L	29 + 2	U	4 + 5 + 2
D	2 squared	M	7 × 2	V	35 × 2
E	12 ÷ 6	N	3^2	W	13 × 5
F	12 × 5 + 1	O	56 ÷ 7	X	a baker's dozen
G	2 + 3 + 10	P	10% of 200	Y	$10^2 - 2$
H	$4^2 + 1$	Q	5 × 3	Z	10^2
I	4 × 10	R	20 ÷ 4		

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22. Use the clues below to determine which employee (Al, Bill, or Sue) works for which boss (Jill, Sam, or Mitch) and which product he/she repairs (VCR, TV, or radio).

a. Sue's name and her boss' name begin with the same letter.
b. Sue does NOT repair TV's.
c. Radio repair is handled by the males.
d. Bill's boss is a male.

▨	Jill	Sam	Mitch	VCR	TV	radio
Al						
Bill						
Sue						

23. Work the problems below in order to complete the crossword puzzle.

▨	1		2
▨		▨	
3	▨	4	▨
5			▨

Across

1 seven hundred less fifteen
5 285 increased by twelve

Down

1 9 × 7
2 11 × 5 - 1
3 one dozen
4 11 × 6 + 1

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Posttest

1. 154 + 276

2 6000 - 3499

3. 15 × 16

4. 245 ÷ 5

5 2/5 + 6/5

6. There are 114 work orders for repairs written in one week. If these are handled by 6 repair people, how many repairs per person, on the average?

7. An employee uses 27 replacement parts per day for 5 days. If there were 150 parts in stock at the beginning of the week, how many still remain?

8. It takes approximately 1 hour and 15 minutes to repair a television set. How many TV's can be repaired in 10 hours?

9. A customer leaves a radio for repair at 8:00 pm on Monday night. He is told to check on the repair in 36 hours. At what time should he call to check?

10. A company employs 245 people. If 20% are female, how many of the employees are male?

11. The Facts: Inventory Count for Electronic Replacement Parts

switches - 146	eject buttons - 98
motors - 215	dials - 300

a. How many more dials are there than switches?
b. How many motors and eject buttons in all?
c. If 96 switches are used, how many remain?
d. 5 dozen motors are defective, how many are NOT defective?
e. How many replacement parts are there in all?

Pretest Answer Key

1. 149

2. 778

3. 306

4. 4.1

5. 3/12 + 8/12 = 11/12

6. 9 × 8 = 72 employees

7. 48 ÷ 24 = 2 days

8. 3 × 12 = 36 repairs

9. 146 - 99 = 47 parts

10. 9 1/2 hours

11.
    a. 10 + 15 = $25
    b. 15 + 30 = $45
    c. $40
    d. eject button
    e. rewind and fast forward (#2, #3) OR #5 won't play at all!!

Posttest Answer Key

1. 430

2. 2501

3. 240

4. 49

5. 8/5 or 1 3/5

6. 114 ÷ 6 = 19 repairs each

7. 150 - (27 × 5) = 150 - 135 = 15 parts remain

8. 10 ÷ 1.25 (1 hr 15 min) = 8 TV's

9. 8:00 am on Wednesday

10. 80% or 0.80(245) = 196 males

11.
    a. 300 - 146 = 154 more
    b. 215 + 98 = 313 in all
    c. 146 - 96 = 50 remain
    d. 5(12) = 60 defective, so 215-60 = 155 are NOT
    e. 146 + 215 + 98 + 300 = 759 parts in all

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Math Skills Review I Answers

1. 16
2. 12
3. 9
4. 3/4
5. 1.5
6. 12
7. 20
8. 2
9. 7
10. 1
11. 4/8 or 1/2
12. 1.3
13. 30
14. 24
15. 12
16. 60
17. 55
18. 3/8
19. 9
20. 156
21. 94
22. 6
23. 6
24. 2
25. 1
26. 5 × 2/1 = 10
27. 5
28. 6

Math Skills Review II Answers

1. 101
2. 100
3. 28.7
4. 6/5 or 1 1/5
5. 80
6. 16/56 + 7/56 = 23/56
7. 22.755
8. 51.6
9. 20/45 - 9/45 = 11/45
10. 3.6
11. 4/9
12. 1018
13. 254
14. 1.78
15. 1/2 × 2/1 = 2/2 or 1
16. 255
17. 1050
18. 0
19. 820
20. 8.7
21. 297
22. 1.44
23. 1 1/3 = 4/3, so 4/3 - 2/3 = 2/3
24. 2.94
25. 5
26. 15.62
27. 3
28. 64.95

Mathematics Curriculum Answer Key

1. 416 - 33 - 17 - 17 = 349 picture tubes in stock
2. a. 19 - 8 = 11 more
   b. 21.50(16) = $344.00
   c. 8(16 + 20 + 19 + 2 + 8 + 41) = 8(106) = $848.00
   d. 2 + 41 + 20 = 63 repairs
   e. 41(20) = 820 minutes or 13 hours and 40 minutes
3. 2.59(5) = $12.95
4. 36 + 38 = 74 degrees Fahrenheit
5. Thursday at 9:00 am
6. 223(89) = 19,847 can openers
7. 45 ÷ 5 = 9 teams
8. 25% or 0.25(488) = 122 people
9. a. 301 - 199 = 102 more motors
   b. 176(1.19) = $209.44
   c. 423 - 106 = 317 more feet
   d. 423 - 315 = 108 feet remain
   e. 215 + 176 = 391 switches and dials
10. 130(35) = $4550.00
11. a. 24(1.70) = $40.80
    b. 0.89 + 0.89 + 1.29 = $3.07, so $3.07 - 2.59 = $0.48 or 48¢ it is cheaper to purchase the combo than to purchase each item in it separately
    c. 10 - (2.39 + 2.39 + 1.29 + 1.29 + 1.29) = 10 - 8.65 = $1.35 in change
    d. 3(0.89) = $2.67 and 2(1.29) = $2.58, so 2.67 - 2.58 = $0.09 or 9¢ difference
    e. Answers will vary. Possibilities include: 8 tacos, OR 5 burritos, OR 2 combo meals, etc...
12. 24.95 + 3.65 = 28.60 and 28.60 + 0.06(28.60) = $30.32
13. 126 ÷ 14 = 9 departments
14. the coolest is 62.6 degrees F and the warmest is 67.4 degrees F
15. 728 - 120 - 2(120) = 368, and 0.25(368) = 92, so 368 - 92 = 276 capacitors remain
16. 146(52) = 7592 transistors
17. 5(1 hr 20 min) = 5 hours 100 minutes or 6 hours 40 minutes from 8 am would be 2:40 pm
18. a. 65 - 8 = 57 more Zenith
    b. 32 - 1 = 31 fewer Sony
    c. Zenith
    d. 15 + 8 + 12 + 65 + 1 + 32 = 133 repairs in all
    e. 0.50(12) = 6 black and white Sharp TV sets
19. 10(40) + 12.50(6.5) = 400 + 81.25 = $481.25
20. 1000 ÷ 1.19 = 8 TV's with $48 left over

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21.

A	2 × 5=10	J	9 × 5 - 1=44	S	3/4 + 1/4=4/4 or 1
B	9 - 6=3	K	6 × 4=24	T	3 × 11=33
C	$7^2 + 1=50$	L	29 + 2=31	U	4 + 5 + 2=11
D	2 squared=4	M	7 × 2=14	V	35 × 2=70
E	12 ÷ 6=2	N	$3^2=9$	W	13 × 5=65
F	12 × 5 + 1=61	O	56 ÷ 7=8	X	a baker's dozen=13
G	2 + 3 + 10=15	P	10% of 200=20	Y	$10^2 - 2=98$
H	$4^2 +1=17$	Q	5 × 3=15	Z	$10^2=100$
I	4 × 10=40	R	20 ÷ 4=5		

" A good example is the best sermon." Thomas Fuller

22.

▨	Jill	Sam	Mitch	VCR	TV	radio
Al		▨	▨	▨		▨
Bill	▨	▨		▨	▨	
Sue	▨		▨		▨	▨

Al works for Jill repairing TV's.
Bill works for Mitch repairing radios.
Sue works for Sam repairing VCR's.

23.

▨	^{1} 6	8	^{2} 5
▨	3	▨	4
^{3} 1	▨	^{4} 6	▨
^{5} 2	9	7	▨

	Across		Down
1	700 - 15 = 685	1	63
5	285 + 12 = 297	2	54
		3	12
		4	67

Pretest

1. 24 + 77

2. 85 - 16 - 23

3. 453 × 2

4. 2/3 of 87

5. 645 + 0.5

6. A retirement home has 66 residents. If there are 11 nurse technicians, each one is responsible for how many residents?

7. On Monday 3 residents leave, on Tuesday 7 more leave and 8 move in. On Wednesday 4 leave and 6 move in. If the week began with 50 residents, how many are there now?

8. A thermos holds 144 ounces of coffee. How many 8 ounce cups of coffee will it hold?

9. It takes approximately 30 minutes to bathe and dress each resident. If there are 21 residents, how long will it take one nurse to complete this task?

10. A customer orders 4 large coffees and 1 small one. How many more large ones are ordered than small ones?

11. The Facts: Work schedule for nurse technicians:

	Monday	Tuesday	Wednesday	Thursday	Friday
Josie	8a-8p	8a-8p	off	8a-8p	8a-8p
Robin	12p-12a	12p-12a	12p-12a	off	12p-12a
Wesley	10p-10a	off	10p-10a	10p-10a	10p-10a

a. How many hours are scheduled for Josie this week?
b. Wesley makes $10.50 per hour. What is his expected gross paycheck amount for this week?
c. Who is scheduled to be working at 11 am on Wednesday?
d. Who is scheduled to be working at 2 pm on Friday?
e. Robin is paid $9 an hour up to 40 hours and $13.50 for each hour over 40. What is her expected gross paycheck amount for this week?

Math Skills Review I

1. 4 + 6
2. 3 + 4 + 5
3. 10 + 7
4. 8 + 7 + 2
5. 24 + 8
6. 15 + 21
7. 7 + 4
8. 10 - 5
9. 14 - 8
10. 27 - 13
11. 114 - 72
12. 88 - 45
13. 8 - 5
14. 12 - 4 - 6
15. 7 × 5
16. 2 × 4
17. 10 × 0
18. 4 × 5
19. 6 × 6
20. 102 × 5
21. 17 × 3
22. 45 ÷ 5
23. 64 ÷ 8
24. 12 ÷ 6
25. 2 ÷ 2
26. 8 ÷ 1
27. 24 ÷ 3
28. 124 ÷ 4

Math Skills Review II

1. 6% of 289
2. 4/5 - 1/6
3. 116 + 238
4. 15 + 10.7
5. 18 × 0.5
6. 9 cubed
7. 2.4 × 1.76
8. 1 1/2 + 2 1/4
9. 448 ÷ 14
10. 24 + 36 + 57
11. 2/3 ÷ 4/9
12. ___% of 18 is 3
13. 2/3 + 1/2
14. 108 ÷ 1.2
15. 4/5 × 3/8
16. 10% of ____ is 24
17. 8 ÷ 8
18. 14% of 82
19. 483 - 102
20. 8 - 7
21. 10 squared
22. 4^2
23. 24 ÷ 6
24. 2 3/4 × 7
25. 2 × 8 × 14
26. 36.4 - 0.78
27. 1.24 + 0.786
28. 288 ÷ 8

Mathematics Curriculum

1. If each of the 74 retirement home residents has 3 guests during visiting day, how many guests are there in all?

2. It takes approximately 20 minutes to bathe and dress each resident. If a nurse technician works a 6 hour shift, how many residents can be bathed and dressed?

3. A retirement home has 57 residents. If each one eats 3 meals a day, how many meals must be prepared each day?

4. A box of sugar cubes contains 48 cubes. If each customer likes his coffee with milk and 2 sugars (2 cubes), how many coffees can be served from 1 box of cubes?

5. The Facts: Retirement home lunch menu offerings in the cafeteria:

   6 oz. tuna fish - \$1.25
   3 oz. chips - \$1.10
   2 slices pizza - \$2.44
   iced tea - \$1.00
   cola - \$1.00
   fruit salad - \$1.76

   a. Determine the cost of 2 slices of pizza and 2 colas.
   b. Determine the cost of 18 ounces of tuna fish and 4 iced teas.
   c. How much change is expected from a \$10 bill if 2 fruit salads, 3 oz. chips, and 2 iced teas are purchased?
   d. Each slice of pizza costs approximately how much?
   e. Determine the cost of 8 slices of pizza.

6. The retirement home has 110 residents. If they are housed in a 5 story building, approximately how many residents are there on each floor?

7. A nurse must complete a minimum of 12 hours of continuing education in a 4 year period. This calculates to an average of ____ hours per year.

8. A coffee thermos holds 72 ounces of liquid. How many 6 ounce cups of coffee can be poured from a full thermos?

9. There are 6 patients assigned to each nurse technician. If there are 13 nurse technicians, how many patients are there?

10. A recreation coordinator has 4 ping pong tables, 2 foosball tables, and 3 shuffleboard courts to work with. If 2 residents can be at each table/court at one time, determine the maximum number of residents that can participate at one time.

11. The Facts: Number of residents at various retirement centers:

Shady Acres - 78	Fieldstone Farms - 124
Happy Town - 95	Langford Villa - 110
Green Leaves - 63	Folly Manor - 206

a. Which center has the most residents? the fewest?
b. How many more residents are there at Fieldstone Farms than at Happy Town?
c. Determine the total number of residents in all 6 of the centers listed above.
d. Put the centers in order from greatest occupancy to least.
e. 50% of the residents at Shady Acres are over 85 years old. How many of them are less than 85?

12. The cost of living in a retirement home is $5058.36 per year. Determine the cost per month.

13. A doctor spends 15 minutes with each patient while doing her rounds. How many patients can be seen at this rate during a 4.5 hour shift?

14. A coffee pot yields 27 6-ounce cups of coffee. How many ounces does this pot hold at a maximum?

15. There are 28 private rooms (1 person occupancy) and 17 semi-private rooms (2 persons occupancy) at a retirement home. When the home is fully occupied, how many people are there in residence?

16. Each floor of a hospital has 3 wings each one containing 11 patient rooms. If there are 7 floors of patient rooms, determine the total number in the hospital.

17. The Facts: Nurse technicians work schedule:

	Mon	Tue	Wed	Thur	Fri	Sat	Sun
Jill	8a-5p	8a-5p	off	8a-5p	8a-5p	off	8a-5p
Jack	4p-11p	off	4p-11p	4p-11p	off	4p-11p	4p-11p
Vanessa	off	7a-7p	7a-7p	off	7a-7p	7a-7p	off

a. How many hours are scheduled for each technician for this week?
b. Who is scheduled to be working at 3 pm on Saturday?
c. All technicians are paid time and a half for any hours over 40 in one week. Will any of these technicians receive overtime pay? If so, who?
d. How many more hours are scheduled for Vanessa than for Jill?
e. Jack is paid $8.75 per hour. What is his expected gross paycheck amount for this week?

18. There are 47 medical personnel on staff at a retirement center. If 15 call in sick on Monday and another 13 are attending a conference, how many staff members are at work?

19. 138 meals are prepared each day in the hospital cafeteria. If each patient receives 3 meals per day, how many patients are there in the hospital?

20. It costs an average of $35.70 per day for room and board in Elm Grove Retirement Community. Determine the yearly cost.

21. Use the clues below to match the person's name with his/her favorite meal and most enjoyable activity.

a. No person's name begins with the same letter as his/her favorite meal.
b. The breakfast person is a male.
c. Micky doesn't enjoy card games at all.
d. The lunch person enjoys ping pong and billiards (pool).

	Breakfast	Lunch	Dinner	Ping Pong	Card games	Shuffleboard
Bud						
Micky						
Laura						

22. Match the word phrases with the symbolic sentence.

twenty-three squared	4 - 2
fourteen increased by ten	1/2 - 2/3
four less than fifteen	5^3
the product of twenty-three and two	14 + 10
five cubed	18 ÷ 6
four less two	23^2
the quotient of eighteen and six	15 - 4
one-half of eighteen	23(2)
one-half decreased by two-thirds	(1/2)(18)

23. **Work the problems below to decode the following quote:**

10 18 4 4 3 10 10   9 10   15 9 15 3 21 1.

15 9 15 3   30 3 33 4 3 15 21

2 6 9 50 18 33 3.

Soichiro Honda

A	2 × 3	N	45 ÷ 3
B	9 + 3	O	56 ÷ 4
C	10 - 6	P	27 + 3
D	5 × 4	Q	7 × 8
E	18 ÷ 6	R	7 × 5 - 2
F	1 × 2	S	1 × 10
G	7 × 7	T	6 × 4 - 3
H	34 + 2	U	23 - 5
I	3 squared	V	50 ÷ 2
J	11 × 2	W	105 - 6
K	7 + 3 + 1	X	$4^2 + 1$
L	$2(5^2)$	Y	17 + 17
M	4 × 7	Z	56 - 16

Posttest

1. 157 + 18

2. 5000 - 1245

3. 246 ÷ 6

4. 4/5 of 90

5. 15 × 0.7

6. A coffee mug holds 6 ounces of liquid. How many mugs full will there be in a 90 ounce thermos?

7. If each resident eats 2 eggs for breakfast, and there are 27 residents, how many eggs are eaten at breakfast in all?

8. Happy Acres home has 115 residents and Sunny Fields home has 98. How many residents are there in all?

9. A retirement home has 9 nurse technicians, each one responsible for 7 residents. How many residents are there in all?

10. There are 4 foosball tables in the recreation room. If it takes 2 people to play a game, how many people can play at one time?

11. The Facts: Retirement Home Cafeteria Breakfast Menu:

coffee	sm. $1.19 and lg. $1.69
danish	$0.89
2 slices toast	$1.00
bagel	w/cr. cheese $2.49
	plain $2.19

a. Determine the cost of 2 plain bagels and a large coffee.
b. Determine the cost of 2 slices of toast, 2 danish, 1 small coffee, and 1 large coffee.
c. Which is more: a bagel with cream cheese and a large coffee OR 2 danish and a small coffee?
d. How much change is expected from a $5 bill if you purchase 2 bagels - one plain and one with cream cheese?
e. You have $3.50 to spend. What can you purchase?

Pretest Answer Key

1. 101
2. 46
3. 906
4. 58
5. 1290
6. 66 ÷ 11 = 6 residents
7. 50 - 3 - 7 + 8 - 4 + 6 = 50
8. 144 ÷ 8 = 18 cups
9. 30(21) = 630 min. or 10.5 hrs
10. 4 - 1 = 3 more
11. a. 8a-8p = 12 hrs., so 12(4) = 48 hours

    b. 10p-10a = 12 hrs., so 12(4) = 48 hrs. and 48(10.50) = $504.00

    c. no one!

    d. Josie and Robin

    e. 12p-12a = 12 hrs., so 12(4) = 48 and 40(9) + 8(13.50) = 360 + 108 = $468.00

Posttest Answer Key

1. 175
2. 3755
3. 41
4. 72
5. 10.5
6. 90 ÷ 6 = 15 mugs
7. 27(2) = 54 eggs
8. 115 + 98 = 213 residents
9. 9(7) = 63 residents
10. 4(2) = 8 people
11. a. 2.19(2) + 1.69 = 4.39 + 1.69 = $6.07

    b. 1.00 + 2(0.89) + 1.19 + 1.69 = $5.66

    c. 2.49 + 1.69 = $4.18 and 2(0.89) + 1.19 = $2.97, so a bagel w/cr. cheese and lg. coffee is more

    d. 2.49 + 2.19 = $4.68, so 5.00 - 4.68 = $0.32

    e. Answers will vary. Possibilities include: 2 small coffees OR 3 danish OR 6 slices of toast, etc.....

Review I Answer Key

1. 10
2. 12
3. 17
4. 17
5. 32
6. 36
7. 11
8. 5
9. 6
10. 14
11. 42
12. 43
13. 3
14. 2
15. 35
16. 8
17. 0
18. 20
19. 36
20. 510
21. 51
22. 5
23. 8
24. 2
25. 1
26. 8
27. 8
28. 31

Review II Answer Key

1. 0.06(289) = 17.34
2. 24/30 - 5/30 = 19/30
3. 354
4. 25.7
5. 9
6. 9(9)(9) = 729
7. 4.224
8. 1 2/4 + 2 1/4 = 3 3/4
9. 32
10. 117
11. 2/3 × 9/4 = 18/12 or 1 6/12 or 1 1/2
12. 18y = 3, so y = 0.166 or 16.6%
13. 4/6 + 3/6 = 7/6 or 1 1/6
14. 90
15. 12/40 or 3/10
16. 0.10y = 24, so y = 240
17. 1
18. 0.14(82) = 11.48
19. 381
20. 1
21. 10(10) = 100
22. 4(4) = 16
23. 4
24. 11/4 × 7 = 77/4 or 19 1/4
25. 224
26. 35.62
27. 2.026
28. 36

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Mathematics Curriculum Answer Key

1. 74(3) = 222 guests
2. 6(60) = 360 min., so 360 ÷ 20 = 18 residents
3. 57(3) = 171 meals per day
4. 48 ÷ 2 = 24 coffees
5. a. 2.44 +2(1) = 2.44 + 2 = $4.44
   b. 1.25(3) + 4(1) = 3.75 + 4 = $7.75
   c. 10 - [2(1.76) + 1.10 + 2(1)] = 10 - [3.52 + 1.10 + 2] = 10 - 6.62 = $3.38
   d. 2.44 ÷ 2 = $1.22 per slice
   e. 2.44(4) = $9.76
6. 110 ÷ 5 = 22 per floor
7. 12 ÷ 4 = 3 hours per year
8. 72 ÷ 6 = 12 coffees
9. 6(13) = 78 patients
10. 4(2) + 2(2) + 3(2) = 8 + 4 + 6 = 18 residents
11. a. Folly Manor; Green Leaves
    b. 124 - 95 = 29 more
    c. 78 + 95 + 63 + 124 + 110 + 206 = 676 in all
    d. Folly Manor, Fieldstone Farms, Langford Villa, Happy Town, Shady Acres, and Green Leaves
    e. 50% or 0.50(78) = 39
12. 5058.36 ÷ 12 = $421.53 per month
13. 4.5(60) = 270 min., so 270 ÷ 15 = 18 patients
14. 27(6) = 162 ounces
15. 28 + 17(2) = 28 + 34 = 62 people
16. 3(11) = 33 rooms per floor, so 33(7) = 231 rooms in all
17. a. 8a-5p = 9 hrs., so Jill = 9(5) = 45 hours AND 4p-11p = 7 hrs., so Jack = 7(5) = 35 hours AND 7a-7p = 12 hrs., so Vanessa = 12(4) = 48 hours
    b. Vanessa
    c. yes, Jill and Vanessa
    d. 48 - 45 = 3 more hours
    e. 35(8.75) = $306.25
18. 47 - 15 - 13 = 19 are at work
19. 138 ÷ 3 = 46 patients
20. 35.70(365) = $13,030.50 per year
21.

	Breakfast	Lunch	Dinner	Ping Pong	Card games	Shuffleboard
Bud	▨		▨		▨	▨
Micky		▨	▨	▨	▨	
Laura	▨	▨		▨		▨

Bud likes lunch and ping pong. Micky likes breakfast and shuffleboard. Laura likes dinner and card games.

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22.

twenty-three squared	4 - 2
fourteen increased by ten	1/2 - 2/3
four less than fifteen	5^3
the product of twenty-three and two	14 + 10
five cubed	18 ÷ 6
four less two	23^2
the quotient of eighteen and six	15 - 4
one-half of eighteen	23(2)
one-half decreased by two-thirds	(1/2)(18)

23.

A	2 × 3=6	N	45 ÷ 3=15
B	9 + 3=12	O	56 ÷ 4=14
C	10 - 6=4	P	27 + 3=30
D	5 × 4=20	Q	7 × 8=56
E	18 ÷ 6=3	R	7 × 5 - 2=33
F	1 × 2=2	S	1 × 10=10
G	7 × 7=49	T	6 × 4 - 3=21
H	34 + 2=36	U	23 - 5=18
I	3 squared=9	V	50 ÷ 2=25
J	11 × 2=22	W	105 - 6=99
K	7 + 3 + 1=11	X	$4^2 + 1=17$
L	$2(5^2)=50$	Y	17 ÷ 17=1
M	4 × 7=28	Z	56 - 16=40

"Success is ninety-nine percent failure." Soichiro Honda

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